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ABSTRACT

The review of teaching strategies examines four areas of potential ecological impact on effective learning in young children--methods for curriculum organization, antecedent instructional events, consequent instructional events, and packages or combinations of instructional events. Four methods of curriculum organization are explained including prescriptive teaching, individualized instruction, task analysis, and large group vs. small group vs. one to one instruction. It is pointed out that results are not yet definitive, but a trend appears to be developing in favor of small group instruction. Teaching strategies in the continuum of antecedent instructional events, listed in order of decreasing teacher support of the child response, are noted to be putting through manual or physical assistance or guidance (hand shaping, passive shaping, or a form of physical prompting); partial physical prompts; direct and indirect modeling; verbal instructions; visual and auditory prompts; direct and indirect primes; and proximity or eye contact. Cited among findings of research on antecedent prompting techniques is that they can be used successfully to teach new motor, social, cognitive, and conduct skills to young normal or handicapped children. Consequences that are likely to strengthen desired behaviors are divided into and discussed in four major categories--teacher behaviors, materials, activities, and other consequent events. Several methods for decreasing behavior are also considered such as corrective feedback, overcorrection, and timeout. (SB)

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A Selective Review

TEACHING STRATEGIES FOR EARLY CHILDHOOD ENVIRONMENTS

by

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TEACHING STRATEGIES FOR EARLY CHILDHOOD ENVIRONMENTS

Introduction

The ecology of early learning is made up of various external conditions surrounding the child when learning is taking place. The ecological section of this review therefore covers a range of environmental events and arrangements.

The teacher is the major agent in the arrangement of environmental events in the ecological systems of early learning environments. The teacher designs all social, physical and instructional-events that comprise the learning milieu. This subsection of the ecological review will focus on the various antecedent and consequent teaching strategies teachers employ to provide effective learning environments for developmentally disabled, delayed, at-risk, and otherwise handicapped children. The teaching strategies examined are used with children in the 2-1/2 to 6 year age range in early learning settings. Strategies appropriate for use with 0 to 2-1/2 year old children will not be discussed. These are examined elsewhere.

In this subsection on teaching strategies major emphasis is on procedures related to instruction that can be manipulated by the teacher. The manipulations to be examined have several characteristics in common. One, they are arrived at through a decision-making process on the part of the teacher. Two, they are based on documented principles derived from learning theory. Three, they are amenable to a systematic and empirical analysis of their effectiveness in helping young handicapped children learn various skills in each of the major areas of development. Four, they can be combined to yield effective teaching packages (or methods of curriculum organization) that can be used with children in many different early education settings.

This review of teaching strategies will examine four areas of potential ecological impact on effective learning in young children. The first is methods for curriculum organization. The second deals with antecedent instructional events. The third concerns consequent instructional events. The fourth area is packages or combinations of instructional events.

Methods for Curriculum Organization

Many curricula for early childhood education for the handicapped were developed over the past decade and a half. Various theories of child development provide the bases for these curricula. Little evidence is available, however, to suggest that one is better than an other, as far as children's learning is concerned.

"A curriculum is to help the teacher get about the business of education and has little to do with the child" (Weikart, Note 1). What does have concern with the child is the way that the teacher organizes the presentations for a selected curriculum. Organization is independent of curriculum content and depends primarily on the instructional strategy selected to insure that children learn the various responses and skills to reach the goals of the curriculum.

Strategies for curriculum organization can be divided several ways. For the purposes of this review, the literature will be examined under four headings: 1) prescriptive teaching, 2) individualized instruction,

3) task analysis, and 4) large group vs small group vs one-to-one instruction. These strategies are obviously not without overlap, but the division helps organize this review.

Prescriptive Teaching

The word prescriptive derives from the word prescribe. Prescribe means to set a course or lay out a direction. Prescriptive teaching is based on two main components. One is a precise statement of what the teacher will do and provide for a given child in terms of that child's level of functioning. The second component of prescriptive teaching, also essential to the process, is a systematic feedback system that enables the teacher to judge the effectiveness of his or her teaching. Prescriptive teaching requires teachers to learn a repertoire of skills and techniques that can be systematically observed, described, and taught to others.

One early study on prescriptive teaching was done by Spicker, Hodges, and McCandless (1966). They used a diagnostic/prescriptive approach to develop a curriculum for a group of 5 year olds described as psychosocially deprived and mentally retarded. Specific deficits were diagnosed and curriculum items were prescribed. Significant gains were reported in language, intelligence and social development after a year in the program. These gains carried over into first grade.

Morrison and Pothier (1972) tested the effectiveness of prescriptive teaching in a study with mentally retarded preschool children. Two groups of children participated in similar remedial training programs. For one group, the training was prescribed according to each individual child's developmental level. The other group received general gross motor training. The children in the prescriptive group made greater gross motor gains than did the general training group.

Prescriptive teaching is especially functional with the severe and profoundly handicapped. Popovich (1977) has done extensive work with this population. In his recent book he describes a checklist for evaluating children and constructing a personalized curriculum. Popovich has also task analyzed the checklist into component parts. Myers, Sinco, and Stalma (1973) developed a competency checklist and individualized prescriptive chart that gives prescriptions in one or more areas and provides ongoing information regarding the child's current level of achievement with prescribed procedures to further increase the child's competencies.

Children's problems can be more readily solved through prescriptive teaching. The precision of the system can pinpoint problems and allow systematic elimination of factors contributing to the problems. In a prescriptive teaching format the teacher has more precise control of the learning process. The teacher can visualize and plan for progressive changes in the child, and the relationship between the child's behavior and the instructional process can be identified and built upon, or altered, as the case may be.

Prouty and McGarry (1973) describe the role of the diagnostic/prescriptive teacher in accordance with their training model. This model includes 1) diagnosing which teaching techniques and materials are most effective with each child and 2) writing educational prescriptions based on those diagnoses.

Closely related to prescriptive teaching is precision teaching. A summary of the advantages of precision teaching was done by Bradfield (1970). Seven main points describe Bradfield's position:

Precision teaching:

1) provides a common language, a means of communication through which all those involved with the education of a given child may begin to communicate in precise and understandable terms
2) requires definitive precision in description of behaviors of concern whether they be academic, social, or physical
3) involves all aspects of the learning situation, including environmental conditions and other stimulus variables, whether these stimuli be curricular materials or social conditions, as well as consequences which may result from behavior
4) provides an ongoing, immediately available effect of any changes which may be attempted in order to modify the behaviors in question
5) allows precise changes in specific parts of the learning environment either antecedent or subsequent to the behavior of concern
6) allows the child's behaviors to guide in terms of educational decisions
7) provides a system wherein the child can very quickly take over the responsibility for his own behavior management and learning and the maintenance of all records, thereby tremendously increasing the potential applicability of such a system.

Individualized Instruction

Individualized instruction is closely related to prescriptive teaching in many ways. Individualized instruction specifies what skills a child needs to learn, and the degree of mastery of each of the specified skills. In individualized instruction it is also stipulated how and under what conditions a particular child should be taught the skills. In addition there is usually a recording system that gives the teacher specific feedback on how well the child is progressing.

The teacher makes decisions about what to teach each child on the basis of where that child is on each skill continuum. The point of proficiency, be it to the far right, or the far left or somewhere in between on the continuum, is the point of entry for the child. Often referred to as the entering behavior, it is here that the teacher begins a program for a child on an individual basis.

Individualized instruction can occur in various settings. The child may be in a group, in a tutorial setting, in an incidental learning situation, or on a field trip. The basic components of individualized instruction as a teaching strategy are 1) the teacher's objective knowledge about where the child is on a continuum related to mastery of a given task, 2) the teacher's specification of appropriate instructional strategies based on first hand knowledge of the child, and 3) constant evaluation of the child's progress in order to decide upon an individualized revision of the program should the child not be learning at an appropriate rate.

Diagnostic teaching is often used in conjunction with terms like individualized instruction and prescriptive teaching. Much diagnostic information is obtained during the initial assessment phase of instruction, and even earlier, perhaps during the identification stage. It is this information the teacher needs to translate prescriptions into individualized instruction. Diagnostic teaching may be viewed as a superordinate classification containing the major components of prescriptive teaching and individualized instruction. The basic purpose of diagnostic teaching might be summarized as the teacher's manipulation of various factors in order to get examples of the child's best responses.

Haring and Hayden (1972) have pulled much of the individualized instruction work together in a comprehensive compilation entitled Improvement of Instruction. Lindsey (1972) writes of individualized instruction from a school principal's point of view. According to his observations the most noticeable effect is that individualized lessons make it possible for each child to be successful in his or her own right and that these high success experiences lead to children displaying a more positive attitude in their general behavior. Frischi (1974), working with autistic and neurologically impaired children, developed an individualized charting system to specify performance goals for each child and to chart progress.

Meier (1976) cites a series of studies related to appropriate individualized remedial techniques that are being field tested in classrooms to determine their efficacy in overcoming various learning disability problems. These techniques are derived from a classroom screening instrument that yields clusters of behavioral indices from which the classroom teacher can select until a particular procedure is found that works best with a given learning-disabled child. In this situation the classroom screening instrument is designed to aid a teacher in individualizing instruction or for appropriate intervention with validated procedures and materials.

Task Analysis

Task analysis (or substructure analysis as it is sometimes called) involves a careful and systematic analysis of the successive subskills in a given task of a more complex nature. The subskills are seen as the necessary prerequisites if a child is to master the more complex task. The basic strategy according to Resnick, Wang and Kaplan (1973) is to develop hierarchies of learning strategies so objectives lower in the hierarchy (that is the simpler tasks) facilitate learning higher objectives which, of course, are the more complex tasks. Thus, the ability to do higher level tasks is a reliable predictor of the ability to perform lower level tasks. Such a procedure, according to Gagne (1971), calls for the identification of specific behavioral components and prerequisites for each of those components specified.

Horner (Note 2) asserts that reducing a complex behavior to a series of single integrated behaviors (and specifying the skills needed for each) provides several advantages: 1) you have a predetermined sequence of behaviors to teach, 2) you have a specific performance criterion for each single behavior, 3) you can measure the rate at which each single behavior is learned, and 4) you can predetermine the specific cues, prompts and rewards for each behavior.

Another approach to task analysis has been the subject of extensive research by Smith, Smith and Haring (Note 3). They have developed a modified lattice system to systematically analyze educational skills. The lattice calls for a graphic display of the analysis of specific tasks. Goals and objectives are put into a hierarchy so educational activities can be planned to help children master various skills in a systematic fashion.

The task analysis concept has been the subject of much study. Seigel (1972) looked at task analysis and effective-teaching. Davies (1972) examined task analysis from the educational technology point of view. Hartley (1972) describes, in a case history, the writing of a task analysis program and Llorens (1973) describes a task analysis approach to working with cognitive and perceptual motor dysfunctions. Thiagarajan, Semmel, and Semmel (1974) have put together a resource book on task analysis for teacher training programs, while Sommerton and Turner (1975) have provided a comprehensive task analysis model for working with severe and profoundly handicapped children.

Group Instruction vs One-to-One Instruction

Early childhood educators have long insisted that young children do best in small groups. The younger the children (or the more handicapped the children) the smaller the group, according to these educators. As children get older, more capable, and closer to entering kindergarten, they should have some experience with large group experiences within the preschool. The data are few to support these hypotheses.

There is some evidence that one-to-one instruction may promote more efficient learning. Again, age of child and degree of handicap seem to be factors of major significance, as is size of group and kind of material being taught.

Jenkins, Mayhall, Peshka, and Jenkins (1974) looked at the issue of small group vs tutorial in a special education resource room. Sabbert, Holt, Nelson, Domash and Etzel (Note 4) demonstrated that five children can learn as efficiently as one child if the teaching materials are optimal. A study in progress (Radgowski, Allen, Schilmoeller, Ruggles & LeBlanc, Note 5) also indicates that a group of four learns French phrases (receptively and expressively) as efficiently as a single child. Wilson, Allen, Ruggles and LeBlanc (Note 6) are also looking at small group vs one-to-one in teaching word recognition to developmentally delayed children. The results are not yet definitive, but a trend appears to be developing in favor of small group instruction.

Introduction to Antecedent and Consequent Instructional Events

After a teacher has chosen specific methods of curriculum organization encompassed in the individualized/prescriptive approach and organized hierarchies of skills to be learned by young children (task analysis), it is necessary to develop discrete strategies for teaching the specific skills. Because the teacher becomes accountable for what children do, or do not, learn, the teacher must develop an extensive repertoire of teaching strategies that can be brought to bear functionally (and altered as needed) in each learning experience presented to a child. The teacher will make multiple decisions about teaching strategies while teaching a child any given skill. Decisions about what strategy to use at a given point in the learning process are influenced by the child's entering skills, the extent of support needed by the child to start the learning process, and the levels of progress achieved at different stages of learning.

The teacher will be molding the ecological learning environment of a child each time a decision is made about teaching strategies. Environmental teaching events (teaching strategies) are ecological factors in the same way changes in room arrangements, group size, etc., are ecological factors.

One way to categorize teaching strategies is by their relationship in time to the responses the child learns in a given teaching context. Some instructional events chosen by the teacher will precede the child response (antecedent events). Some will come after a child response (consequent events). A teacher will frequently combine antecedent and consequent instructional elements into a teaching package.

Antecedent Instructional Events

Antecedent instructional events are teacher input delivered immediately before, or during, the child response being taught. These antecedent events support or cue the occurrence of the child response. Antecedent teaching events can be ordered along a continuum according to the amount of teacher support delivered. Total physical support is one extreme, and simple proximity or eye contact is the minimum antecedent cue support. Teaching strategies included in this continuum of antecedent instructional events, listed in order of decreasing teacher support of the child response are: putting through, partial physical prompts, direct and indirect modeling, verbal instructions, visual and auditory prompts, direct and indirect primes, and proximity or eye contact. As the amount of teaching support decreases across these teaching strategies, the level of independent responding expected of the child is increased. Thus, "putting through" involves maximum teacher support and little independent responding on the part of the child, while techniques of simple proximity and eye contact involve minimal teacher cues and a great deal of independence of child response.

All antecedent teaching strategies discussed in this section are types of stimulus support most often included under the generic label of "prompting." As described by Hawkins (1977), the point of prompting is:

> . . . to provide extra, temporary, stimulus support for accurate responding so that correct responses can occur immediately and be reinforced. The stimulus support is "extra" in the sense that it contains more stimulus components than will eventually be required to produce the behavior; and it is "temporary" in the sense that it will eventually be removed. Extensive prompting is one aspect of assuring success and thus making learning a very positive experience for children. . . (p. 109).

Putting Through

Putting through is a maximum support strategy variously called manual or physical assistance or guidance, hand shaping, passive shaping, or a form of physical prompting (Hawkins, 1977; Johnson & Werner, 1975; O'Leary & O'Leary, 1977; Watson, 1972). A teacher or trainer physically guides the child through the motor responses of the skill being taught. For example, in a self feeding program, the trainer's hand might hold the child's hand around a spoon, then dip the child's hand with the spoon down to the plate. The trainer would then scoop food, lift the child's hand and filled spoon to the child's mouth, gently open the child's mouth by touching the child's chin, guide the spoon into the mouth, assist in motions of leaving food in the mouth, and remove the spoon (O'Brien, Bugle, & Azrin, 1972).

Putting through was initially demonstrated to be an effective technique for teaching beginning motor imitation skills to young retarded children (Baer, Peterson & Sherman, 1967; Risley & Baer, 1973). In recent years the technique of physical assistance has been recommended for the initial stages of training a variety of motor skills for which instructions or models might be too complex to be readily understood by the child being trained (O'Leary & O'Leary, 1977). Physical assistance is a widely recommended procedure for the initial training levels in programs for basic self help skills such as feeding, dressing, and toothbrushing (Copeland, Ford & Solon, 1976; O'Brien et al., 1972; Watson, 1972). In addition, putting through has been a component in two studies that trained retarded children to perform verbally instructed motor responses, some of a general nature, e.g., clap hands (Whitman, Zakaras, & Chardos, 1971), and some specifically related to receptive language prepositional relationships (Frisch & Schumaker, 1974).

The advantage of putting through is that it can be used with children at any developmental level, regardless of their language skills, so long as the child is receptive to being touched and guided. This technique gives the child the "feel" of the desired motor responses. It also guarantees the child contact with the reinforcers following completion of the motor response, e.g., food in mouth, praise by the trainer, etc.

Some of these positive consequences are intrinsic to the response being completed. Others are programmed by the trainer. As the child has successful contacts with both the response being trained and its consequences, the trainer gradually withdraws complete physical assistance, substituting lesser forms of support until the child is eventually performing the response independent of any but the normal antecedent cues.

Partial Physical Prompt

Partial physical prompts also involves touching or other physical supports. In this technique the teacher or trainer uses touch or a physical prop as a form of "suggestion" to the child regarding what body part to move, or as support for starting a motor response. But the teacher does not provide the complete physical support of the putting through strategy. For example, in imitation training, the trainer might raise a hand to show the expected response, then touch or partially lift the child's hand to "suggest" the correct imitation. Touching or partially lifting the child's hand constitutes a partial physical prompt. In a manipulation task the trainer might touch the child's hand with a peg as a cue to the child to grasp the peg and place it in an adjacent pegboard. Partial physical prompts serve as response initiators or reminders for the skill being trained.

Partial physical prompts are mentioned frequently in the literature in relation to fading or transition phases between complete physical assistance and independent child response under normal antecedent and consequent cues. In this context a trainer may start with a putting through procedure and gradually reduce the amount of physical support, substituting partial physical prompts, to make support less conclusive. Eventually, even partial physical prompts can be reduced to the level of a simple touch to a body part as a reminder to the child to respond at a given time.

Partial physical prompts are used during prompt fading stages in generalized motor imitation training with young retarded children (Baer et al., 1967), and in training in following prepositional receptive language instructions with one retarded child (Frisch & Schumaker, 1974). Various levels of physical prompts are used in training handicapped children to walk unassisted (Meyerson, Kerr & Michael, 1967; to walk down stairs (Fowler, Rowbury, Nordyke, & Baer, 1976); and to sit appropriately in a chair and manipulate preschool materials (Twardosz & Sajwaj, 1972).

Partial physical prompts are recommended in training manuals and texts for trainers of handicapped children, with special reference to the training of dressing, feeding, motor imitation, and beginning language skills (Copeland et al., 1976; Johnson & Werner, 1975; Watson, 1972).

Direct and Indirect Modelling

Modelling (demonstration) is a strategy in which a teacher performs the exact verbal or motor response expected of the child while the child is watching and listening. The child then duplicates the behavior of the teaching agent, using the agent's model as an antecedent cue to complete and exact information on which to base the performance of a new response. In its simplest form, "direct modelling," modelling is a procedure in which the teaching agent "shows" the child how to perform a new response, then asks the child to repeat or match the model (O'Leary & O'Leary, 1977).

Using modelling as a technique for teaching new responses presupposes that the child has acquired basic imitation skills. The child must have learned how to attend to a spoken or visual model and how to respond to, or duplicate, that model shortly after it occurs. In cases where children are severely delayed, the imitation skills may have to be taught before modelling can become a generalized instructional procedure. Procedures have been developed for teaching both motor imitation skills and verbal imitation skills (Baer et al., 1967, Lovaas, Berberich, Perloff, & Shaeffer, 1966). These procedures for teaching imitative skills rely heavily on putting through and partial physical prompts, as well as shaping, fading, and reinforcement.

Modelling techniques are used extensively in training basic language skills to nonverbal or language deficient children. Guess, Sailor, and Baer (1974) reviewed the experimental literature on behavioral training procedures for teaching language to retarded and autistic children. Modelling was a component strategy in each of the reviewed training programs, at each level of language skill. For example, in training expressive language labelling skills the following modelling technique has been employed. A picture or object is presented together with a verbal model of its label. The child is reinforced for imitating the name. The time is gradually increased between the presentation of the object and the saying of the modelled name. This allows the child time to make an independent response without the model. If reliance on the model continues to be predominant, then the object is presented, delay occurs, and the teacher gives only a partial model, possibly the first few sounds, but not the complete word. Gradually the model is made less complete until the child is correctly labelling the object in the presence of a question ("What is this?") with no verbal model (Risley & Wolf, 1966).

Additional applications of modelling techniques have been used to train correct articulation of initial phonemes (Bennett, 1974) and complete descriptive sentence forms (Bennett & Ling, 1972). In the first study, modelling and reinforcement procedures were combined to train two hearing impaired girls to articulate correct /f/ and /sh/ phonemes in the initial position of words in response to training pictures. Once established through modelling and imitation, the correct articulation of these sounds generalized to new words (pictures) in the absence of modelling. Modelling was effective in establishing a general articulation skill.

In the second study a complex language response was trained--descriptive sentences in the form, "The (noun) is (verb) + ing." An example of this form would be, "The girl is swimming." This use of modelling is notable because it was successful in teaching the complex language form to a 3 year old hearing impaired girl who had formerly used only telegrahic language (noun and verb) with no use of articles or auxiliary verbs. By the end of training, the subject had generalized the complex descriptive language form to over 90 percent (out of 15) untrained and unreinforced sentences in the presence of novel pictures. Again, initial training using modelling and reinforcement produced a generalized language pattern in novel untrained contexts.

Experimental validation of direct modelling techniques is less prevalent for the areas of gross motor skills, self help skills, or preacademic skills. However, direct modelling strategies are still recommended in training manuals for teaching self help skills (Copeland et al., 1976); and direct modelling is mentioned as a component in at least one study in which preacademic skills were trained (Rowbury, Baer, & Baer, 1976). The extensive use of modelling in experimental studies of language training has led to the incorporation of elaborate descriptions of modelling techniques in manuals for training basic language skills (Gray & Ryan, 1973; Guess, Sailor, & Baer, 1976a & b; Harris, 1976).

The modelling procedures described to this point are called direct modelling. A teacher has been in an explicit instructional role, often in a 1:1 setting, and the child is directly instructed to watch the modelled response and duplicate it. Common to all direct modelling procedures is the explcit or implicit instruction, "Watch me, and do what I do, now."

A second level of modelling is called indirect modelling. This procedure has also undergone experimental examination and is functional as a teaching strategy for establishing new response repertoires in children. In indirect modelling procedures the models for discrete behaviors or classes of behaviors are made available to the child, but the actual requirement that the child duplicate the modelled response immediately is absent. The common experimental question asked in studies seeking to validate indirect modelling procedures is double edged: "Can children learn just by observing, and will they acquire many new behaviors in this fashion?" To date, studies suggest a positive answer to both aspects of the question.

Initial support for the premise that children can learn new behaviors by observing was established in a series of studies conducted by Bandura and his colleagues. These studies are reviewed by O'Connor (1969). Of particular interest is that positive modelling effects were achieved with an indirect method called "symbolic modelling" in which the subjects watched films of modelled behavior. While the setting for modelling excluded extraneous stimuli and thus tended to focus attention on the modelled response, in these studies the modelling agents were "symbolic," i.e., not live and in proximity to the subjects. In addition, there were no direct instructions to imitate the modelled response.

O'Connor (1969, 1972) extended the use of symbolic modelling procedures to therapeutic applications with young socially withdrawn normal preschool children. Children in the experimental isolate groups viewed a 23 minute film which consisted of 11 scenes of children engaging in social interaction in a preschool setting. The sequence of scenes systematically increased level (passive to active) of the interaction and in the number of children engaged. Each scene showed a model child joining an ongoing group, and depicted positive interaction consequences for the children. In addition, a narrative soundtrack described the particular interaction behaviors of the models and noted positive responses of the other children.

The combined results of the O'Connor studies showed that, immediately after viewing the film, isolate children showed increased levels of social interaction in their preschool classrooms. In addition, these effects appeared durable over time, whether or not these children received additional shaping and reinforcement for interaction. Furthermore, the levels of increased interaction of the isolate children receiving symbolic modelling were equal to those of nonisolate peers.

The positive effect of symbolic modelling as a technique to increase social interaction in withdrawn children is further substantiated and elaborated in a study by Jakibchuck and Smeriglio (1976). These authors found positive effects in two symbolic modelling conditions, but the larger effect was obtained where the narrative track of the film was done by a child speaking in the first person, as opposed to a second condition in which the narrative track of the same film was done by a child speaking in the third person ("My name is Danny. I want to join that group"; versus "That boy is Danny. He wants to join that group.").

Indirect modelling procedures can also be conducted by live models who demonstrate specific responses, or classes of behavior, in the presence of children who have previously emitted low levels of those behaviors. Indirect live modelling was one component of a study that successfully increased normal preschool children's rates of four classes of behavior: 1) sharing, general praise of peers, 3) specific praise of peers, and 4) accurately reporting their performance of these classes of behavior (Rogers-Warren & Baer, 1976). Adult models demonstrated each class of interactive and reporting behavior in the presence of a group of four children in a small group setting. While modelling alone was not sufficient to establish a high level of one of the behaviors--sharing--modelling plus reinforcement established higher levels of all four classes of behavior. In this study, modelling served as a facilitator for those children who did not already emit (know how to perform) the interactive and reporting behaviors.

In a second study, Lahey (1971) used a live indirect modelling procedure without reinforcement to establish high levels of use of descriptive adjectives of quantity and color in preschool Head Start children. During the experimental condition the adult teaching agent described a box of objects, using color and number descriptors. The adult then gave the child a different box of objects and an instruction to "Tell me about these." A procedure of alternating turns between the teacher and the child produced an increase in rate of adjectives per noun usage in 10 Head Start children, which was equal to the adult's use, or greater. Since the objects described by the adult and the children differed, the procedure produced not simply miming the adult's responses, but instead, an imitation of a "class" of behavior known as descriptive adjectives.

Verbal Instructions

As an antecedent teaching strategy, verbal instruction consists of "telling a child exactly what to do" in a situation where the child may have difficulty performing, or remembering to perform, a discrete behavior or a chain of behaviors. Verbal instructions can become a form of supplemental support added to the normal cue conditions.

Using instructions as antecedent support for a chain of behaviors might occur in an early childhood classroom when a teacher announces, "Get ready to go outside." Many children will know how to perform the chain of responses incorporated in "getting ready to go outside," others will benefit from additional instructional support while they are learning the chain. A skilled teaching agent will provide clear, discrete verbal instructions, as needed, for each successive step in the chain. These might take the following form: "Johnny, put the truck on the shelf"----child response; "Now, go to your locker."----child response; "Put on your coat."----child response; "Zip it up."----child response; "Now go stand in line by the door."----last response in the chain.

Using instructions as an antecedent teaching strategy presupposes that a child has sufficient receptive language skill to understand the verbal information provided by the teacher. In addition, the child must be under "instructional control," i.e., must have a history of following instructions and be sufficiently motivated to continue following them. Variables influencing the use and following of instructions are discussed in another section of this review.

When supplemental instructions have generated the reliable occurrence of the behavior(s) desired, the teacher may begin to systematically decrease both the completeness and number of supplemental instructions. When this fading of instructions is completed, the child will be performing the behavior or chain independently under the normal cue conditions. In the example given above, the child will have learned to perform the entire "getting ready" chain when only one general instruction is given to the group--"Get ready to go outside."

Visual and Auditory Prompts

Visual and verbal prompts have many properties in common with the other antecedent strategies. They, like the others, are supplemental events added to the normal cue conditions to support the acquisition of a new response or to promote the reliable occurrence of a partially mastered response. As with all antecedent support strategies, visual and verbal prompting is successful only when their use meets two conditions: 1) they must produce the response during initial training, and 2) the final stages must consist of a transfer of control of the response from the supplemental prompt to the normal cue conditions under which the response is generally expected to occur. Prompts must be influential during training, but they must be capable of being withdrawn, however gradually, leaving the newly acquired response intact. The two-part criterion for judging the success or failure of prompting procedure has been a point of discussion in the literature. Relevant points of this discussion are described in this section.

Visual prompts are extra visual cues added to a training setting to produce either a new response or an old response under new stimulus conditions. Often the visual prompts incorporate an already known discrimination of the child, using it as the basis for establishing a new response through the process of transfer of control of the response from the known visual cue to the unknown. Color matching is an example of a known discrimination employed in visual prompting procedures to teach new responses. In a study by Fowler, Rowbury, Nordyke, & Baer (1976), two preschool girls with various learning problems knew how to match colors, but did not know how to descend stairs in an age-appropriate alternating foot pattern. To train alternating stair descent, pieces of red and yellow tape were placed on the upper toes of each child's left and right shoes. Corresponding pieces of red and yellow tape were placed on alternating steps of the stairwell in their preschool building. The girls were taught to match the tape on their shoes to the tape on the steps. Correct color matching of shoe and step tapes automatically produced an alternating descent pattern. When the girls had become skilled in this color-prompted motor pattern, the tapes on their shoes were gradually faded (decreased) in size, and tapes were gradually faded (removed) from the steps in 2-step units. By the end of the training both girls were able to walk down stairs correctly in an alternating pattern in the absence of visual tape prompts.

Color matching was also the basis of a visual prompt for correct pencil holding in a different study (Mendoza, Holt, & Jackson, 1978). Two boys in one preschool classroom had difficulty holding a pencil in the standard three-finger grip for controlled pencil movements. During training, three colors of tape were placed on the boys' pencils in positions appropriate to correct holding. Corresponding colored circles were drawn on the boys' fingers with magic markers. When the boys matched all three colors on fingers and pencils, they were engaged in appropriate pencil holding. This visual prompting procedure produced substantial increases in the accuracy of pencil holding in both boys during training. During subsequent fading of the tapes and circles one boy maintained a high level of correct holding throughout fading, finally in the absence of the visual prompts. The other boy showed continued dependence on the visual prompts.

A final example of color coded visual prompting is in a program developed by Margaret Cooper Holmberg (1972) to teach young children to tie their shoes. In the initial phases of the program the two laces of a model shoe are colored red and white to promote their easy differentiation and to cue placement positions noted by colored tape on the shoe board to which the model shoe is attached. In addition, two small pieces of white tape are attached to each lace to prompt the making of bow loops through tape matching, and pieces of black tape cued the placement of one loop on another to start the square knot tie. Many children have been trained to tie shoes, first on a shoe board, then on their feet, using these visual prompts. During fading phrases of the program all tapes and colors are removed gradually, leaving the shoe-typing responses intact in the absence of the supplemental visual prompts.

Superimposition is another visual prompting procedure to promote children's learning of complex visual discriminations. Two procedures are described in the literature under the general label of "superimposition." In the first, a stimulus to be learned (e.g., the word dog) is presented along with an already known stimulus (e.g., a picture of a dog) on the same card or visual display. Typically, the picture is above the word or vice versa. This procedure could also be called "justaposition" or "pairing." In the second procedure, the unknown stimulus is presented directly on top of the known stimulus in the visual display. In the example given, the word "dog" would appear directly on the figure of the dog, and hence would be direct superimposition of one stimulus over another.

In either of the superimposition procedures the goal is to have the known visual stimulus cue the correct response initially, in the presence of the unknown stimulus, then to produce a shift in control of the correct response from the known stimulus dimension to the unknown stimulus dimension. In the word and picture example given above, the dog picture would cue saying, "dog," in a child who knew picture labels. When the picture and word were presented stimultaneoulsy (either juxtaposed or superimposed), the picture would cue the child's verbal "dog" response in the presence of the picture _and_ the word. The eventual success of the picture prompt procedure would be assessed when the word was finally presented alone. If the child said "dog," then a transfer in control from the picture to the word would have occurred.

Two training procedures are possible when superimposition is used as a visual prompt. It is possible simply to present the superimposed or juxtaposed stimuli together on many trials, then to present the previously unknown stimuli alone. This is a technique of simple withdrawal of the visual prompt. In contrast to simple withdrawal is the procedure of fading the visual intensity or completeness (detail) of the known visual prompt over trials, the last step in the fading process being the unknown stimulus alone, with no part of the known stimulus visible. Two studies, one with normal children (Corey & Shamow, 1972); and one with retarded children (Dorry & Zeaman, 1973) have compared superimposition with fading to superimposition with no fading in teaching sight reading vocabulary. While both procedures result in correct responses while a known picture prompt is present, the fading procedure clearly produced greater retention of the sight reading vocabulary when the list of trained words was presented in a posttest with no extra visual prompts. From these results it is suggested that fading of prompts facilitates transfer from known stimulus dimensions to unknown dimensions when superimposition is the visual prompting procedure. This assumption about fading has also been extended to the other studies of prompting that have been described in this and previous sections. Fading is a widely used transfer of control procedure, with at least some experimental validation of its function.

As the number of studies using visual and auditory prompting procedures grew, some detailed analyses of "critical features" of visual and auditory prompting emerged. The fading versus no fading comparison represents one critical feature. A second critical feature involves analyses of the topographical relationship between the supplemental prompt that is selected and the criterion response to be learned by the child.

Examinations of the topographical relationship between a prompt and the new behavior to be learned involve comparisons between types of prompts called "criterion referenced cues" versus "non criterion referenced cues" (Schilmoeller & Etzel, 1977), or "within stimulus prompts" versus "extra stimulus prompts" (Rincover & Koegel, 1977; Schriebman, 1975). The distinction being drawn is whether the prompt that is selected is actually a manipulation of parts of the to-be-learned response (final discrimination) through accentuation or exaggeration, or whether the prompt points out the correct response but is not part of the criterion discrimination. Prompting procedures that are exaggerations or accentuations within the discrimination to be learned are "criterion referenced" or "within stimulus prompts." Those that alter a dimension other than actual parts of the discrimination, which merely highlight correct response, are called "non criterion referenced" prompts or "extra stimulus prompts."

Studies using color-matching and word-picture superimposition as prompts are examples of non-criterion referenced or extra stimulus prompts. Color matching and picture labelling are not a part of the to-be-learned responses of walking or recongition of letter configurations distinguishing word labels from one another. On the other hand, in a procedure to teach a discrimination of the numeral 3 from the numeral 5, an exaggeration of the top bar on the 5, which is gradually faded over trials, would constitute a criterion referenced or within stimulus prompt (Rincover & Koegel, 1977). This exaggeration involves manipulation of part of the criterion discrimination, since the distinction between a bar or a curve at the top is essential in differentiating the two numerals.

Experimental comparisons of within-stimulus versus extra-stimulus prompting procedures have come from two arenas in applied behavior analysis. The success or failure of these procedures have been examined by a group of psychologists who work with autistic children. The procedures have also been the subject of research by psychologists who work in the area of programmed learning through errorless stimulus control. In the studies with autistic children a very consistent learning pattern has emerged when prompts are used to train new skills. When the prompts are extra stimulus prompts, the autistic children "hook onto" the extra stimulus dimension and fail to attend to the dimension necessary for the criterion discrimination. This stimulus overselectivity produces a pattern of response in which adequate levels of correct responding occur as long as some element of the extra stimulus prompt is present. In the final fading step, performance falls apart when all components of the extra stimulus prompts are removed. Thus, there is a failure in transfer of control from a known stimulus dimension to the unknown. This finding is corroborated by early research with autistic children which indicates that they respond to only one dimension of a complex stimulus, although the one dimension selectively responded to may vary among autistic children (reviewed in Rincover & Koegel, 1977).

This finding of stimulus overselectivity in autistic children has led to the conclusion that these children cannot respond simultaneously to more than one stimulus dimension, and therefore that prompting is successful only when the prompt dimension is the same as the criterion response dimension, i.e., an exaggeration of a critical feature within the stimuli of the critical discrimdination. Schriebman (1975) compared extra stimulus versus within stimulus prompting procedures with autistic children in both visual and auditory modes of prompt/discrimination. In a visual matching task involving a fine discrimination of a tilted straight line versus an inverse V shaped line, training with graded levels of _E_'s pointing to the correct response (extra stimulus prompt) were compared to within-stimulus prompt training which exaggerated elements of difference between the two lines. The visual prompt of pointing failed to produce transfer of control from the point to the line discrimination during the final stage of fading of the point, each time it was used. On the other hand, the within-prompt procedure was successful the majority of times it was employed. These results were duplicated in the auditory mode when an extra stimulus prompt of a buzzer, paired with the correct auditory match words, was compared to a volume increase and exaggeration of the critical syllables (within stimulus prompt) in auditory discrimination among similar word pairs.

In the field of programmed learning through errorless stimulus control, comparisons of criterion referenced versus non criterion referenced prompting have been conducted within programs designed to teach complex discriminations to normal children (Schilmoeller & Etzel, 1977). Again, the results point to better posttest and retention performance in children whose errorless programs consisted of criterion referenced prompting, focused on the critical within stimulus features. Although both programs result in virtually errorless performance during training and fading, only the criterion referenced prompt programs consistently demonstrated transfer of control to the criterion discrimination when all supplemental prompt procedures were finally absent.

The results of these sets of studies indicate that the topographical similarity between the prompting dimension that is selected and the to-be-learned response may be a critical feature determining the success or failure of prompting with some populations of children, or in some complex discriminations. While extra stimulus prompts have been successful in certain learning contexts, there have been failures in others. When failure of common prompts occurs, it would be wise to look closely at the topographical relationship of the prompt to the response to be learned. In choosing prompts for the first time, a conservative approach would suggest selection of those prompts most related to the new response, if the pool of possible prompt procedures is large.

Auditory prompts are supplemental cues that are heard rather than seen. Although types of auditory cues can range from buzzers, beeps, and ringing timers to spoken words (verbal prompts), the literature on auditory prompting procedures has focused primarily on the use of various levels of verbal prompts.

Two studies employing nonverbal auditory prompts include the Schriebman (1975) study in which the buzzer was unsuccessfully used to facilitate discriminations between very similar sounding words. The buzzer was paired with one of the two words, but not the other. As noted previously, there was no transfer of control from the buzzer to the spoken words when fading was completed.

In a second study (Wedel, Rowbury & Baer, Note 7) a tape-recorded beep was sounded on an average of once a minute during a preacademic work period in a classroom for children with learning and behavior problems. If the target children were on-task when the beep sounded the teacher praised them, saying, "Good, you were working when the beep went off." This pairing of the beep and teacher praise resulted in increases in on-task behavior which were maintained in subsequent conditions when the beep was presented alone with no teacher praise. The results of this study suggest that the auditory beep came to function as a combination cue/reinforcer for on-task behavior of the target children. As such, it could have continued as a convenient non-social prompt, requiring very little teacher time after the initial training/pairing stages. Subsequent studies of similar non-social auditory prompts are needed to replicate these findings and examine fading procedures for gradual removal of even the brief beep, leaving on-task behavior intact.

Verbal auditory prompts have been examined by Risley, Hart, and Reynolds in studies designed to expand the language skills of disadvantaged kindergarten and preschool children. In an early study Risley and Reynolds (1970) examined the role of verbal emphasis as a prompt for verbal imitation. In this examination of a common technique, emphasis consisted of stressing certain words by raising the voice. In individual sessions children were instructed to do what the teacher did. The teacher would then read sentences to the child. After each sentence the teacher paused and waited for the child to respond. Any verbalization by the child was consequated with half an M & M. The sentences the teacher read were composed of varying numbers of phrases. Each sentence contained certain underlined words which were to be stressed by the teacher. Various proportions of words in the sentences were stressed, ranging from 4 percent to 32 percent of the spoken words in a sentence across two experiments.

The results of the two experiments showed that emphasis was a successful auditory prompt when the proportion of stressed words in the sentences was low. When low proportions of emphasized words were used, the children were most likely to remember and articulate (imitate) the words that had been stressed and the phrases that contained them, as compared with levels of imitation of non-stressed words and phrases. Thus, emphasis can be an effective auditory prompt, if it is used judiciously.

In subsequent studies, Hart and Risley have described a gradual range of prompts used successfully in their "incidental teaching" model for training expanded language skills (Hart & Risley, 1974; 1975). The series consists of four levels of prompts delivered in descending order until the child responds correctly with appropriate language. The graded prompts are used in a classroom context in which a child who wants certain materials must get them through the teacher (or occasionally a peer).

The first level consists of a teacher looking attentively at the child and waiting "expectantly" for 30 seconds. This is actually a minimal visual-social cue designed to elicit a verbal request for a material. The second level consists of a general question to the child which indicates the type or form of the language response expected from the child in requesting the material. Examples of Level 2 prompts include questions such as, "What do you want?" to elicit a request of the topography "I want a noun label." Other Level 2 prompts designed to cue language responses which include descriptors or multiple phrases would be: "What kind do you want?" or "Why do you want it? What will you use it for?"

Level 3 prompts suggest more specific detail to a child who does not respond to the format generality of Levels 1 and 2. Level 3 is designed to suggest specific parts of speech to the child, e.g., noun labels, adjective descriptors such as color and size, or complete sentences. Examples of Level 3 prompts would be: "What is it called?" or "I have red cars and blue cars;" or "Say the whole thing (sentence)." The final and most detailed level of prompt these authors describe, Level 4, consists of complete or partial models of the expected language response. Examples would include: "Say, 'I want a crayon'"; or "Say, 'I want a red car'"; or "Say, 'I want blue paint so I can make a picture.'"

The authors have taught disadvantaged children to request materials first by noun label, then using adjective noun combinations, and then using color-adjective-noun phrases. Finally, they taught the children to request materials using compound sentence formats in which the children requested materials by name and described how they would use them.

The eventual goal of the graduated verbal prompting procedures is to have these children move up through the levels of prompts until they are finally using the expanded language skills in their spontaneous speech in response to normal cues in the adult world. Within the latter conditions of their first study the authors report that the trained language forms did not have to be specifically prompted by the teachers. The children spontaneously initiated requests using the expanded forms. It appears that the children had learned to respond without prompts on some occasions, although some modest level of prompting might have been necessary to maintain the general language repertoires shown in the first study. In the second study, which focused training on only compound sentences, compound sentences were maintained at higher than initial baseline levels when all verbal prompting was withdrawn.

Verbal prompts can be used to promote not only language skills, but also other types of cognitive skills in young children. Several basic research studies have examined the role of verbal information prompts and questions in children's learning. A common paradigm has been to examine children's free recall of sets of pictures or lists of words under different display and prompting conditions. It is then inferred that the children's free recall responses reflect developmental aspects of verbal learning, memory, information processing, and problem solving strategies.

Visual groups of pictures and oral lists of words in one free recall study were presented to normal 5-1/2 year old children attending a preschool setting (Baumeister & Luszez, 1976). In some conditions there were no clear associations among the words in a list or the picture in a set. In other conditions the pictures or words were categorically related, e.g., animals body parts, vehicles, tools, toys. After seeing a set of words or pictures the children were immediately asked to recall the items in a set. The results of this study showed that categorical lists produced greater recall than non categorical lists, but the best recall was produced when a verbal prompt informing the child of the categorical nature of a set was delivered by the experimenter before the set was presented. Thus, a minimal informational, verbal prompt facilitated what the children learned, i.e., remembered.

Two studies have examined the role of questions as facilitators of normal and retarded children's recall of associate pairs of pictures (Buiun & Turnure, 1977; Turnure, Buiun, & Thurlow, 1976). The experimenter's questions in both studies were of the "What" or "Why" variety and focused on eliciting a "creative" child answer. The experimenter's question included a descriptive relationship between the two picture pairs being presented. Examples of the questions include: "What is the soap doing under the jacket?" or "Why is the soap hiding in the jacket?" or "Why is the soap in the jacket?" Both retarded and normal children who were asked these questions and shown picture pairs performed better in a subsequent recall test than did children in other conditions who received only modelled lables, or a modelled sentence of the relationship, or a cue to elicit a sentence. The results were replicated in the second, cross-cultural study with young Israeli children. The results suggest that the question conditions helped the children develop their own verbal mediators relating the two pictures, and that the child-produced answers to the "What" and "Why" questions produced greater recall of the word pairs.

It is possible that the universal custom of questioning children during social discourse may, in fact, be an influential variable in developmental changes in specific cognitive abilities. Questions as prompts in teaching settings may thus generate a variety of new and creative skills in normal and handicapped children. While the use of open-ended questions is recommended in many teaching models, very few studies have systematically analyzed the effects of these questions or the scope of behaviors for which questioning would be a successful verbal prompt.

Direct and Indirect Primes

A prime is a brief suggestion, made by a teacher, which prompts the target child to perform the first response in a desired chain of behaviors. The assumption is that once a child is started into the chain, the child may continue the rest of the chain independently (possibly with successively increasing amounts of skill or for increasing periods of time). Priming is a minimal antecedent attention technique designed to help children "start" a desired behavioral chain, much as a pump is "primed" with small amounts of water. Primes can consist of either physical contact or a verbal statement by the teaching agent. Their primary characteristics are that the attentional episode by the teaching agent is brief, and their focus is on the "entry responses" (first responses) to a chain of behavior.

Two forms of primes, direct and indirect, are used therapeutically in experimental studies with young children. A direct prime is a suggestion to start a behavior chain. It is delivered directly to the subject child. A direct prime might take the form, "Sue (subject child), ask Mimi to ride the bus with you." The assumption here is that if Sue, a low interactor, will ask Mimi to ride, this may set the occasion for Sue to engage in continued episodes of physical and verbal interactions with Mimi on the bus.

Indirect primes are suggestions made by a teacher to a child other than the subject child. These suggestions request the "other" child to approach the subject child and prompt the first responses in a behavior chain. Thus, indirect primes are third-order prompts to the subject child. They take the form: Teaching agent primes "other" child to prime subject child. An example might be, "Bob (other child), take these extra blocks and cars to Bill (subject child) and ask if you can help with his road." In this example the teacher is suggesting that the other child approach the subject child, who is a low interactor, with materials and a verbal prime for joint play. Indirect primes can become a technique of choice on occasions when the adult thinks that adult suggestions may be less powerful than peer suggestions, or when the adult wants to avoid drawing the subject child into an adult-child, rather than child-child, interaction.

Direct primes have been employed successfully as parts of instructional packages designed to increase an isolate child's interaction with peers (Ingram, Cooper, Baer, & Wolf reported in Baer & Wolf, 1970); to increase frequency and level of skill of motor responses on outdoor play equipment in both normal and handicapped children (Cooper, Lee, Bierlein, Wolf, & Baer, reported in Baer & Wolf, 1968; Hardiman, Goetz, Reuter, & LeBlanc, 1975); and to increase the frequency of walking versus crawling in four retarded children (O'Brien, Azrin, & Bugle, 1972). In the Ingram et al., and Hardiman et al., studies direct primes consisted of verbal suggestions to the subject to initiate interaction with a peer or to actively participate in motor activity on one of six pieces of outdoor motor equipment.

The Cooper et al., study employed direct physical primes which consisted of a teacher periodically lifting the child onto a piece of outdoor motor equipment. In this study increases in use of outdoor motor equipment were accompanied by collateral increases in touching, talking to, and some cooperative play with peers. A physical prime was also used in the O'Brien et al., study. After a child in this study emited three seconds of crawling behavior the adult teaching agents lifted the child to a standing position, which constituted the first response in the walking chain. The experimental package which included these direct physical primes was used successfully to increase frequencies of walking by four retarded children, both in experimental training rooms and later in the children's preschool classrooms.

A study by Kirby and Toler (1970), employed an interesting variant of direct priming techniques. The teaching agents in this study primed a 5-year-old isolate preschool child to initiate interactions with peers by giving him a bag of candy to pass out to peers during a period immediately preceding the 60 minute period when the child's interactions were recorded. The child was instructed to separately ask each child in the class which of a choice of two types of candies was wanted and then to give a piece of candy of the type requested. The procedure was designed to prime both a verbal interaction and a motor exchange. During the conditions when this pre-play priming procedure was in effect there were increases in the child's subsequent time spent with peers during the following 60 minute free play period. The increases in peer related behavior were greatest for proximity to peers, but some increase was also seen in cooperative play.

To date, indirect primes have been used primarily in instructional packages designed to increase the levels of peer social interaction in low interacting or isolate children. The Ingram et al., study described above used a combination of direct and indirect primes plus reinforcement for interaction during its most successful conditions. Indirect primes are mentioned in a brief description of a study by Foxwell, Thomson, Coats, Baer, and Wolf (reported in Baer & Wolf, 1968). In these studies indirect primes consisted of suggestions or requests to peers to initiate to subject children or to play in the activity being engaged in by the subject.

A recent study by Strain, Shores, and Timm (1977) included a training procedure for confederate peers. It was designed to increase their social approaches to six behaviorally handicapped isolate peers during triad play periods in a special playroom. Two socially active confederates, one for each triad of isolate subjects, were chosen from a normal day care program housed in the same building as the special treatment program in which the six subjects were enrolled. The two confederates each received four, 20 minute training sessions with an adult teacher before the initial intervention condition was begun with the isolate subjects. During training sessions the confederates were told they were going to learn how to help the adult by getting other children to play with them. The confederates were told that they were to try their best to get the other children to play with them, although the children might not respond to many of their attempts. Training then included role playing examples with the adult taking the role of the isolate children while encouraging the confederates to initiate social play. Praise for appropriate initiations was delivered to confederates at the end of each training and experimental day. At the beginning of each experimental intervention day the confederates were instructed again to try their best to get the other children to play with them (indirect prime).

During the intervention phases of the study there were substantial increases in the subjects' responses to confederates' initiations and in independent initiations to confederates and peers in five of six subjects. There were only minimal changes in the social behaviors of the sixth subject during the 18 minute play sessions. (Each subject was observed for six consecutive minutes of the 18 minute play period of his triad.) This procedure of indirect priming through confederate training, and one daily instruction, increased both prompted social responses and independent social initiations in five of six behaviorally handicapped isolate children.

Proximity or Eye Contact

There is a wide range of antecedent prompting strategies a teacher can employ to provide initial, temporary support for new or weak child responses. The amount of antecedent support that the teacher delivers can vary from the maximum physical support of "putting through" to the minimum suggestive support of direct or indirect primes. Proximity and eye contact also have some influence. While proximity or aspects of facial attention would involve even less support from the teacher, there are very few references in the research literature concerning proximity or facial expression as a form of antecedent prompt for child responses. This common technique, unlike the others described in this section, has not been subjected to experimental validation.

Summary of Antecedent Prompting

Taken as a whole, the research on antecedent prompting techniques suggests the following:

1. Antecedent prompts can be used successfully to teach new motor, social, cognitive, and conduct skills to young normal or handicapped children.
2. To be successful, any prompting technique must meet the two-part criterion of establishing a new behavior during training and leaving the new response intact when the supplemental prompt is withdrawn.

3. The success or failure of transfer of control in prompting procedures may, on occasion, be related to the similarity between the stimulus dimensions of the prompt and the dimensions of the to-be-learned response.
4. Any of the prompts described in this section can be delivered several ways. How they are used depends on the target child skill and the creativity of the teacher.

Consequent Events

As indicated in the preceding section there are instructional events (antecedent) which precede the hoped-for response in the child and there are instructional events which follow the child's response. The latter are the subject of this section. Most frequently, the instructional events following the child's response are referred to as consequences or consequent events. These consequent events range from a pat on the back, to a scolding, to a frown, to the opportunity to play with a favorite doll or truck, to a host of other events commonly and uncommonly found in the classroom.

An examination of these consequent instructional events follows. It is first necessary to specify briefly the function of consequent events. A consequent event either strengthens the response which it follows or weakens that response, depending upon the child and what pleases or displeases that child. Consequent events are popularly called positive and negative reinforcers. The process is called reinforcement. "The essence of reinforcement is that it is idiosyncratic" (Baer, p. 7, in press). Baer goes on to say that the function of a consequent event as a "positive reinforcer, negative reinforcer, or neither, is likely to be specific to person, time, place, and past experience." Therefore, teachers must select consequent events that lead to an increase in desired responses and to a decrease in undesired responses. Teachers must also monitor the child's responses continuously (ongoing assessment) to ascertain that the reinforcement maintains its effectiveness.

The review of the literature on consequent instructional events is divided into two parts: consequences that increase responses and consequences that decrease responses. Within each of these headings are events that have been demonstrated to have universal effects as reinforcers across a wide range of behaviors in young children. In no way does this imply that Baer's notion of the idiosyncratic nature of reinforcement is invalid.

Consequences that Increase Behavior

Consequences that are likely to strengthen desired behaviors can be divided into major categories: 1) teacher behaviors, 2) materials, 3) activities, and 4) other consequent events.

Teacher Behaviors

What the teacher does and when the teacher does it as a consequence of child behavior is perhaps the most important teaching strategy. Teachers have long been recognized as powerful reinforcers of young children's behavior (Harris, Wolf & Baer, 1964). Teachers in the preschool classroom behave in different ways. Sometimes they talk to children, sometimes they come in physical contact with them, and sometimes they simply stand nearby, perhaps smiling or just watching. They often do several of these things in combination. All teacher behaviors have reinforcing consequences for the most young children, both handicapped and nonhandicapped.

But there are some behaviors in young children that do not respond to adult social rienforcement. One example is the quality of motor performance. Martens (1970), in a study with 25 boys and girls three to five years old using contingent praise and negative feedback, was not able to substantially increase skill in rolling a tennis ball up an inclined board to hit a target at the top. The failure of adult attention to influence complex motor responding is explained by a lack of motor control by the child.

Verbal Feedback: Preschool teachers tend to give praise, verbal feedback about what the child is doing, and general comments and statements.

Praise: Praise may take the form of generally approving statements: "Good boy," "Fine job," "You are playing nicely today," or it may be descriptive praise specific to the activity: "Those are beautiful bright red circles you are painting." "Good for you. You came as soon as I called you." "You are smart! You did find the book with the frog on the cover."

While both kinds of praise have been demonstrated to be effective reinforcers, the "situation specific" or descriptive praise, that is, praise which precisely describes the dimensions of the desired behavior, results in faster and more effective learning. In either case, there can be little question about the efficacy of praise (Hawkins, 1977).

Descriptive praise is discussed in detail by LeBlanc, Etzel, and Domash (in press). The following is taken from their work.

> Teachers routinely maintain high levels of child attention, instruction-following, and task behavior with such descriptive comments as, "I'm glad you are looking right at me so I know you are listening," "You hung your sweater in your locker just like I asked, that's nice," and "Thanks for putting all the beads and strings back into the box" (Beal & LeBlanc, Note 8; Hawn, Cooper & LeBlanc, Note 9; Kastl, Holmberg & Baer, Note 10; and Rogers, Thomson & Baer, Note 11). In working with a preschool cerebral palsied boy, Hogan, Cooper, LeBlanc and Etzel (Note 12) demonstrated the powerful effects of Descriptive Praise for increasing the child's standing and walking, with such teacher comments as, "That's great, you can reach the shelf when you stand tall!" This procedure was demonstrated to be superior to General Praise for increasing and maintaining this behavior. In addition to facilitating motor development, Descriptive Praise is also beneficial in teaching children academic skills, e.g., "Right, the word 'pan' is the correct answer" (Poulson, Baer, & LeBlanc, Note 13), or "That's a good sentence. You told me what the girl looks like and what she is doing" (Domash, Goetz, Schilmoeller & Etzel, Note 14). Baer, Goetz and their colleagues have also demonstrated the utility of Descriptive Praise for increasing childrening's creativity as measured by their production of diverse forms or shapes within blockbuilding, easel painting and other free-form tasks (Fallon & Goetz, 1975; Holman, Goetz & Baer, 1977; Goetz & Baer, 1973; Goetz, Jones & Weamer, 1974; Goetz & Salmonson, 1972). In this research, Descriptive Praise, which was provided each time a child created a form for the first time, acknowledged the nature and novelty of the form, e.g., "You built a tall arch! That's the first arch you made today."

Positive verbal feedback, essentially, is letting children know what they have done or are doing right. Often it is in the form of specific verbalizations from the teacher: "You are putting all the blue chips in the blue cup," "So far, you have found three triangles--only two to go." "You are getting to be a safe driver. You remembered not to bump anyone." Positive verbal feedback and descriptive praise are often difficult to distinguish one from each other. The main difference is that the child in a good feedback system gets immediate information regarding the correctness (or error) of specific responses (Peters, 1972). One common way teachers provide feedback, especially on paper and pencil tasks, is by marking each child's paper. Unfortunately, as Hawkins (1977) points out, "the practice that is most economical of time is to mark only errors." He goes on to say that a more positive approach would be to mark only correct responses and have the child immediately redo the ones left unmarked (the errors).

General Verbal: Simply talking to and responding to their verbalizations is an important reinforcer for many children. In other words, comments, observational statements, questions, and general conversation relevant to the child's interests can increase a contiguous behavior (Harris, 1965).

Feedback, of course, must not necessarily be delivered verbally to be effective in teaching a correct response. With 26 profoundly deaf children, Willimain and Lee (1971) used a pitch detector and tactile display as feedback for the appropriateness of imitation in the individual studied. The tactile display was effective in giving the children voicing and frequency referents.

Physical: Most young children seek physical help and closeness with the significant adults in their environment. And most preschool teachers are nurturing individuals who tend to respond physically to children in their charge. When a child comes to lean against a teacher, most teachers put an arm around the child as a matter of course. If a child takes a tumble off the tricycle, the teacher goes immediately to untangle child from tricycle and to comfort the child, often by holding and patting while crooning comforting words.

In the Bereiter Engleman system, the teacher uses a handshake to congratulate the child on a correct response. Many children are responsive to such instructional consequences (Allen & Turner, Note 15).

Because most young children are more physically dependent upon adults than are older children, preschool teachers must carefully monitor their own responding. Always responding to some child's pleas for assistance may rob that child of opportunities for learning self-help skills. Always rushing to pick up and brush off an "accident-prone" child may only increase that child's frequency of falling.

Facial and Gestural: Many young children are sharply tuned to even the smallest behavioral responses from the teacher. A teacher's smile, nod, wave of the hand, or finger to the lips can all effect the behavior of young children. A child who had been feverishly trying a puzzle piece this way and that often needs only a nod from the teacher to relax and know that piece has finally been placed properly.

LeBlanc, Etzel and Domash (in press) suggest however that even a simple smile (usually considered a positive consequence) can immediately stop the behavior of some children in some situations and can increase behavior of other children in the same situation. They suggest further that a smile might also serve as a positive or negative consequence at the same time: a teacher's smile might decrease role playing of a child while increasing eye contact and smiling on the part of the same child.

Teacher Presence: The presence or absence of the teacher also has an effect on the behavior of many children. It is well established that children may behave one way when the teacher is in the room but emit a quite different set of responses in the absence of the teacher.

Even proximity of teacher to child may have an effect on some response patterns. In the sandbox for example, sand throwing and other grossly inappropriate uses of the sand seldom occur if the teacher is sitting on the edge of the box with the children (Allen, 1974). More inappropriate usage seems to occur when a teacher, even though attentive, is stationed at a distance.

Teachers are socially powerful reinforcers for young children. They emit a variety of behaviors that effect children's responding. Rarely do teachers engage in only one of these responses. They usually present a behavioral package to the child as a consequence of the child's responding. A typical package consists of simultaneous smiling, putting one arm around the child and pointing with the other hand to the child's painting while saying something laudatory such as, "What beautiful colors you used!" Therefore, most research on adult social reinforcement deals with packages rather than discrete units of teacher behavior.

Differential Reinforcement: Differential reinforcement means that one response rather than another is reinforced. In the case of adult, social reinforcement this can be translated into the judicious use of teacher attention in order to strengthen child behaviors deemed desirable by the teacher.

Differential reinforcement is also used to strengthen a better approximation to a response rather than some poorer version of that response. In this sense, differential reinforcement is shaping by successive approximations, a topic to be discussed later.

DRO: DRO, the differential reinforcement of other behaviors, is used frequently with young children. DRO means that the individual is reinforced for abstaining from making a given response for a specified time. In other words, the child is reinforced for any behavior other than the one specified. Thus, DRO is a response-weakening procedure for a specified behavior, but a response strengthening procedure for other behaviors.

An early and now classic example of DRO was done by Sherman (1965) demonstrating experimental control of speech in what had been a mute psychotic. In the DRO schedule (differential reinforcement of other behaviors) food was delivered when the patient engaged in any behavior other than speaking. Reinforcement had previously depended on the occurrence of a specific performance (speaking); now any behavior the patient might engage in except speaking, produced food. Thus, any time the patient spoke, the experimenter did not say "very good"; nor did he deliver food. However, as soon as a 30-second period elapsed in which a vocal performance had not occurred, the experimenter immediately said "very good" and gave food. Thus, frequency of speaking fell markedly even though food continued to be presented about every 30-seconds.

Goetz, Holmberg and LeBlanc (1975) compared DRO and non-contingent reinforcement as control procedures in modifying a three-year-old preschooler's noncompliance. Contingent reinforcement increased compliance in all manipulation periods. Noncontingent reinforcement decreased compliance during reversal conditions. The behavior was variable, however, and did not decrease to the low levels reached during the two DRO reversals.

Materials

Presentation of materials of various kinds are another major source of reinforcers or consequent events in teaching young children (in fact, individuals of all ages). Most commonly used are tokens (these take many forms), edibles and drinkables, toys, trinkets, play materials, or child-selected reinforcers from a "menu" or smorgasbord. Literally hundreds of examples of the use of each of these classes of reinforcers can be found in the literature.

Tokens: Token systems provide an effective method for generating socially and educationally important behaviors in a wide variety of settings starting with the early studies by a number of investigators (Ayllon & Azrin, 1965; Birnbrauer, Wolf, Kidder, & Jague, 1965; Clark, Lackowicz & Wolf, 1968; Girardeau & Spradlin, 1964; Staats & Butterfield, 1965; Wolf, Giles & Hall, 1967; Cohen, Filipszak, & Bis, Note 16). A token is usually any physical object (plastic chip, check mark, gold start, Happy Face stamp) that can be exchanged later for other reinforcers. The latter are often referred to as back-up reinforcers. (Money is a prime example of an effective token for most people because of the range of back-up reinforcers money can buy.)

In many school and institutional situations token economies have been installed. These are highly effective in systemically motivating appropriate instructional responses. Kazdin and Bootzin (1972) in their review state that token economies:

1. bridge the delay between the target response and back-up reinforcement;
2. permit the reinforcement of a response at any time;

3. may be used to maintain performance over extended periods of time when the back-up reinforcer cannot be parcelled out;
4. allow sequences of responses to be reinforced without interruption;
4. maintain their reinforcing properties because of their relative independence of deprivation states;
6. are less subject to satiation effects;
7. provide the same reinforcement for individuals who have different preferences in back-up reinforcers; and
8. may take on greater incentive values than a single primary reinforcer since, according to Ferster and DeMyer (1962) the effects resulting from association with each primary reinforcer may summate (p. 343).

Various token systems are used in the laboratory preschools in the Department of Human Development at the University of Kansas. Domash, Goetz, Schilmoeller and Etzel (Note 14) provided stickers of children's favorite animals and gold stars that could be formed into pictures to take home as reinforcers for speicified responses. Radgowski, Allen, Schilmoeller, Ruggles and LeBlanc (Note 5) used pennies to reinforce learning of French phrases in the preschool. The pennies were placed in a small jar. When a sufficient quantity (previously specified) had been amassed the child could trade them in and choose a nicely mounted picture pertaining to France to put into the child's own book about France.

In the delivery of tokens it is well to inform the child of the number of responses necessary to achieve the backup reinforcer and then to deliver the token immediately following each desired response. Thus the children can judge their own progress toward meeting the requirement (Rowbury, Baer & Baer, 1976; and Swint, Thomson & Baer, Note 17).

Many other classroom studies have been done employing token economies. These have been reviewed by O'Leary and Drabman (1971). In addition, a large number of ongoing classroom programs include token economies (e.g., Hawkins & Hayes, 1974; Miller & Schneider, 1970; Walker & Buckley, 1972). A teacher wishing to install a token system can use these references for ideas or can obtain material designed specifically to assist in setting up an economy, such as Walker and Buckley's (1974) programmed text, a booklet by Bushell (1974), or a book by Ayllon and Azrin (1968b).

Food and Drink: Things to eat and drink have long been used as reinforcers. One early study by Black and Thomas (1966) examined the differential effectiveness of candy, tokens and social reinforcement in discrimination tasks in three groups of Down's Syndrome individuals. The tokens-redeemable-for-candy group performed at a significantly higher level than did the candy-only group, while the performance of the social reinforcement group did not differ significantly from either of the others.

Many preschool teachers prefer to avoid the use of food reinforcers. They give a variety of reasons, mostly valid, especially if the teacher has control of other reinforcers, as do most preschool teachers. There are children, however, who are only weakly reinforced or reinforced not at all by teacher attention, play materials and play activities. For these children, food sometimes must be used as a reinforcer to achieve the initial breakthrough. One of the earliest empirical demonstrations of the power of food as an effective consequence was teaching a young institutionalized child to wear glasses (Wolf, Risley & Mees, 1964). Bites of breakfast and ice cream were used to reinforce better approximations to glasses wearing.

Cunningham, Cooper, Schilmoeller and LeBlanc (1975) used small bits of favorite food with a child who was not learning under regular instructional procedures. Subsequently the child was shifted to tokens (not exchanged for other reinforcers) to provide feedback for correct responding.

Pairing teacher praise and attention with the delivery of candy or other desired foods increases the effectiveness of teacher praise for children who are not responsive to adult attention (Allen, 1966; Brawley, Harris, Allen, Fleming, & Peterson, 1969; Hawn, Cooper & LeBlanc, Note 9). In each instance, the food or candy was soon eliminated as teacher attention became reinforcing in and of itself because of its earlier pairing with a primary reinforcer.

Toys, Play Materials and Trinkets: Preschool teachers have at their disposal a wealth of reinforcers in the form of toys, play equipment, and play materials. These can be freely available, their use totally noncontingent on any prescribed response from the child. On the other hand, the teacher can withhold a certain material(s) in order to present it judicially as a consequence for a desired response. The latter procedure is a major aspect of incidental teaching discussed elsewhere in this review.

When using toys and play materials as reinforcers teachers must select carefully. If the teacher is hoping to reinforce cooperative play then the teacher must present materials that will reinforce cooperative rather than isolate play. Quilitch and Risley (1973) demonstrated, for example, that when teachers make available only toys designed for social play, then social play predominates. (In such studies the play materials might be viewed as both antecedent and consequent instructional events when determining teaching strategies.)

Menu of Reinforcers: Young children, for the most part, are eager to work and play with many different materials. Sometimes, however, they become satiated. Block play, for example, so exclusively desirable for a certain child last week may be spurned this week. Young children, too, are often described as having a shorter span of attention than older children. They may dip in and out of a half a dozen desired activities within a free play period. Thus, teachers of young children need to observe their children carefully and keep track of reinforcers relevant to each child's preferences. This allows teachers to always have consequences available to reinforce appropriate responses.

Homme, Csanyi, Gonzales and Reichs (1969) suggest an RE (reinforcing event) menu. For preschool children a variety of pictures of play materials (and activities) are mounted on a poster. Children may choose in advance of a task or upon completion of a task what they will play with once they have done their work or carried out the teacher's instructions. The pictures can be changed in accord with children's current preferences.

Some children must be brought in contact with potential reinforcers so they find out that certain materials (and foods and activities of individuals) reinforcing properties. This is especially true of severely disturbed, retarded or multiply handicapped individuals. To acquaint these individuals with potential reinforcers, Allyon and Azrin (1968a) developed a reinforcer sampling procedure. They used the procedure with psychotic adults to systemically bring each individual into contact with the items available as backups (or trade-ins) for tokens earned.

The same procedure can be used with young children, whether part of a token system or not. Many preschoolers miss out on a variety of reinforcing activities because they do not have the skill or are afraid to try. Allen, Benning and Drummond (1972) describes the use of gentle coercion by a teacher to get a four-year-old girl (isolate and motor impaired) onto a tricycle so that she might learn to ride and thus experience a reinforcing event that would bring her into the mainstream of large group motor activities in the preschool.

Activities as Consequent Events

The preschool abounds with activities that most young children engage in eagerly: tricycle riding, playing with blocks, playing in water, manipulating cars and trucks, running and shouting (out-of-doors hopefully) are but a few examples. These favorite activities, sometimes referred to as high strength behaviors (Meacham & Wiesen, 1969), can be powerful consequences. Technically, high strength behaviors refer to behaviors that occur naturally with high frequency. These can be used to reinforce behaviors with lower natural frequencies. This idea stems from work done by Premack (1959, 1965) and has come to be known as the Premack principle. One distinct advantage of the use of preferred activities and free time is avoidance of a possible overkill in the use of material reinforcers (Osborn, 1969). Teachers, of course, have used free time as a reward for years. In the behavioral approach, its use has merely been systematized to produce more appropriate deportment and to accelerate academic progress.

Productive use of the Premack principle has been documented by Hommi, de Baca, Devine, Steinhorst, and Rickert (1963). In this early study, control of inappropriate behaviors in preschool children was achieved through systematic application of the Premack principle. Other examples of the effectiveness of the system include the following: with kindergarten girls, Wasik (1970) used contingent free choice of activity to increase children's productivity in individual and group work periods. Salzberg, Wheeler, Devar and Hopkins (1971), through intermittent feedback and contingent access to play activities increased the accuracy of kindergartener's printing responses. In a remedial classroom, Richard Taylor and Libb (1973), using preferred activity reinforcement, increased performance in programmed reading and math activities. Hopkins, Schutte and Garton (1971) employed contingent access to a playroom for free-time activity for primary children. This resulted in progressive increase in both work rate and quality of printing and writing responses.

The Premack principle has been generalized to actual organization of the classroom. Classrooms have been divided into low and high strength areas (Haring & Kunzelman, 1966; Haring & Phillips, 1972). Academic "low strength" areas contain study carrells, tables, communication and reading centers. The other parts of the room contain a number of activities which children enjoy and can use independently for the most part.

One study of considerable interest demonstrated that non-preferred activities could become preferred activities if token payment was paired with the non-preferred task (Betancourt & Zeiler, 1971). Such preferences were demonstrated with 24 preschoolers both within and between subjects. More often than not, access to preferred activities and free play is combined with several other types of instructional variables. Rowbury, Baer and Baer (1976) demonstrated such relationships in their study of the interactions between teacher guidance and contingent access to play activities as they attempted to develop and expand the preacademic skills of children with developmental problems and developmental delays.

Easy versus more Difficult Responses: Another version of the Premack principle has been the presentation of an easy to accomplish task following the completion of a task which the child finds difficult. There seems to be a dearth of data to support this practical procedure.

Other Consequent Events

Other reinforcers have demonstrated effectiveness with children. Visual and auditory reinforcers (music, beeps, movies, light) increase appropriate responding. Fineman and Ferjo (1969) for example, increased a deaf schizophrenic child's vocal by reinforcing each utterance with the presentation of a flashing array of colors across a TV-like screen.

Soft beeps, tone or buzzers have also been used, not so much as reinforcers for children but as reminders to teachers to deliver praise and other reinforcement (Baer & Etzel, Note 18; Goetz, Ayala, Hatfield, Wedel, Rowbury & Baer, Note 7). Such a system is particularly useful in the initial stages of increasing a desirable behavior. It reminds the teacher to deliver reinforcement frequently. As the behavior increases the need for the auditory reminder is greatly decreased.

Taking Polaroid pictures of children and their work is an effective reinforcer. Romero, Holt, Stella and Etzel (Note 19) took pictures of a child and that child's creation immediately following the creative endeavor. In this instance the child's output of creative and artistic products increased.

Various systems of self-counting and self-monitoring have also been used. A kindergarten child, when given a digital counter, counted his own correct letter responses to flash card presentations in a tutorial session with marked increase in correct responding (Allen & Turner, Note 15).

Self-evaluation is an effective reinforcer for many children. It has been called the highest level of reinforcement by Kaufer (1962) and by Goldiamond (1965). Unfortunately, this level of reinforcement is left to chance by most teachers, even though there is general agreement among traditional educators that this type of reinforcement (a form of intrinsic) is greatly preferred to other forms discussed above (extrinsic). Few data support their thesis, however.

Self-evaluating procedures with young children employ some kind of auditory, manipulative, or paper and pencil component. Holmberg, Hursh and Etzel (Note 20) used a "beat the bell" procedure to get a young cerebral palsied boy to walk more quickly to the snack table where he received further reinforcement in the form of praise and food. With this procedure the child was always able to evaluate his own gains. A combination of auditory signal and a bead-counting bracelet was used to teach a preschool girl with a corrected club foot to walk flat on her feet rather than on her toes (Durgan, Cooper, LeBlanc, Note 21; McClure-Porteous, Cooper, Plummer & LeBlanc, Note 22). The child was to determine for herself if she was walking with her heels down when the tone sounded. If she was, she moved a bead on her bracelet. A specified number of beads on the appropriate side of the bracelet resulted in the child being allowed to choose a small toy to keep.

An auditory stimulus was also used to get children to count on their fingers how many times they had been disruptive at large group time (Reiber, Schilmoeller & LeBlanc, 1976). Holman and Baer (Note 23), also demonstrated an increase in independent paper and pencil responses when children counted the number of pages they had completed on a bead bracelet. Plummer (Note 24) demonstrated the effectiveness of simple abacuses and containers in which to drop marbles as self-reinforcing and self-monitoring devices.

One advantage of teaching self-evaluative skills is that it helps children to be less dependent upon adults for approval, praise and feedback (Broden, Hall & Mitts, 1971; Drabman, Spitalnik & O'Leary, 1973; Turkewitz, O'Leary & Ironsmith, 1975). If a child learns to make self-evaluative statements, then there is no need for the child to run to the teacher constantly asking, "Is this good?" or "Is my paper nice?" (O'Leary & O'Leary, 1977).

Consequences that Decrease Behavior: Just as there are a variety of consequent events to produce an increase in behavior, so are there consequent events that have a high probability of producing a decrease in behavior. Much the same framework can be used for examining these as was used for looking at the consequences that increase behavior in the foregoing section. Many of the consequences which increase behavior have also demonstrated the opposite: removal or withholding of the consequences, especially when paired with the reinforcement of other behavior (as in a DRO or reversal condition) results in a decrease in behavior.

Teacher Behaviors Intended to Decrease Behavior: Many teachers scold, criticize, nag, cajole and ridicule. They are acting upon an unsubstantiated premise that they can decrease inappropriate behaviors in children through such strategies. Verbal reprimanding is used by almost all teachers. Despite their frequent use, the effects of reprimands (and other forms of negative verbalizations) have not been thoroughly investigated. A few studies can be cited, however.

In 1968, O'Leary and Becker found that disruptive behaviors in first grade children during rest period could be effectively reduced through presentation of softly spoken reprimands. O'Leary, Kaufman, Kass and Drabman (1970) did a subsequent study in which they further documented the effectiveness of soft reprimanding (reprimanding so that only the child concerned heard the reprimand).

Another example of teacher verbalizing that effectively reduced severely inappropriate behaviors was done by Hall, Axelrod, Foundapoulos, Shellman, Campbell & Cranston (1971). It involved a seven-year-old girl who pinched and bit herself, other children and teachers. The teacher was instructed to point to the child and shout "No" each time pinching or biting occurred.

Hawkins and Hayes (1974) noted that a teacher made long, involved corrective responses to the incorrect answers given by a child. Correct answers received only minimal verbal responding from the teacher. Under these "natural" conditions errors predominated. When the teacher was persuaded to reverse her strategy, correct answers predominated. Apparently this child, and many others, find the amount of teacher verbal behavior more powerful than brief praise statements.

If reprimands are used it is probably best to reprimand just as the child begins to display an undesired behavior rather than to deliver the reprimand after the undesired behavior has been doing on for a while (Jones & Miller, 1974; Walters, Parke & Cane, 1965).

Madsen, Becker, Thomas, Kaser and Plager (1968) investigated the verbal behavior of a teacher who scolded children when they were out of their seat. They coupled the scolding with a command to sit down. Madsen et al.'s data indicated that for the class as a whole the teacher's scolding and command "Sit down" served as a reinforcer for getting out of their seats.

McAllister, Stackowiak, Baer and Conderman (1969) demonstrated that teacher disapproval produced an increase in behavior deemed undesirable. In another study, Thomas, Becker and Armstrong (1968) found that severe disapproval such as yelling, shaking and belittling increased classroom disorder when delivered in a setting in which positive reinforcement for good behavior was lacking.

Negative verbalizations (and other forms of negative consequences) may be effective if used in conjunction with differential reinforcement of appropriate behavior. A study by Jones and Miller (1974) illustrates a combination: quick and relatively mild negative verbalizations followed by verbal attention to other children who are behaving appropriately and subsequently to the disruptive child (shortly after that child begins behaving appropriately) result in an overall reduction of disruptive behaviors.

Corrective Feedback: Feedback indicating correct or incorrect responses is the basic characteristics of learning by trial and error. Feedback for incorrect responding is usually delivered in one of two ways, either by telling the child that he or she is wrong, or telling the child that he or she is wrong and then indicating the correct response. LeBlanc, Etzel, and Domash (in press) argue against the use of "No" or "That's wrong" in correction procedures, suggesting that such words usually bring about emotional responses that interfere with subsequent learning. They posited, however, that for children who do not understand the difference between when they are right or wrong the use of emphasized words sometimes makes the discrimination easier. Another point made by LeBlanc et al. is that it is important to reinforce only when a response is correct the first time. They cite Cunningham, Cooper, Plummer and LeBlanc (Note 25) who demonstrated that a child could control the teacher's praise and reinforcement by waiting for the teacher to correct the response and only then responding. Thus the child did not have to learn the discrimination but had only to wait for the teacher to give the answer.

Physical: The use of physical consequences (spanking, shaking, slapping, pinching and shock) to reduce undesirable responses is a class of teaching not condoned by most classroom teachers and parents. Empirical analysis of the effects of physical punishment in preschool classrooms are meager. Where severe aversive consequences have been used, it has most often been with children with a long history of psychotic behavior (Birnbrauer, 1968; Bucher & Lovaas, 1967; Tate & Baroff, 1966).

In one study Lovaas, Schaeffer and Simmons (1965) reported effective decreases in self-destructive behaviors in distrubed children by presented an aversive shock contingent on each self-destructive response. Kohlenburg, Levin and Belcher (1973) also demonstrated reduction of self-destructive behaviors in a seven-year-old (generally kept in restraints 24 hours a day) through contingent electric shock. More recently Linscheid and Cunningham (1977) demonstrated the effectiveness of using a very mild electric shock to eliminate chronic vomiting in a nine-month-old hospitalized infant displaying severe weight loss, malnutrition and secondary medical complications judged potentially fatal by the pediatric staff.

Overcorrection: Overcorrection procedures are a form of negative consequence found to be effective in dealing with a variety of problems such as excessive self-stimulation behaviors (Foxx & Azrin, 1973). Two types of overcorrection are described by Foxx and Azrin (1973). One is restitutional overcorrection which requires the individual to repair the consequences of his or her behavior to a better than normal state. They give an example of the child who crayons on the wall who will be expected to remove not only the crayon marks but to wash clean the entire wall as well. The second form of overcorrection is positive practice. This requires the individual to practice correct responses contingent upon emission of incorrect responses or misbehaviors in the same topography. In this vein, the child who drew upon the wall might be required to copy the same patterns over and over on paper.

Foxx (1977) used the avoidance of overcorrection (in this instance, requiring the child to move her head up, down, or straight under a teacher's manual guidance with instructions to hold each position for 15 seconds) to increase eye contact in young retarded and autistic children. Doke and Epstein (19750 used overcorrection (vigorous tooth brushing with Listerine for 2 minutes) to reduce thumbsucking in day care children. In this group of studies a vicarious effect (observational learning) was also reported in a thumb-sucking child who was not treated but who witnessed the oral overcorrection with another child, thus demonstrating an unanticipated side effect.

Another example of overcorrection with an older subject had to do with verbal reprimands and subsequently overcorrection in the form of handwashing to reduce searching behaviors defined as touching floors, walls, furniture, etc. (Rusch, Close, Hops & Agosta, 1976). Overcorrection did eliminate searching behaviors during experimental periods. In a final experimental phase, decreased searching was maintained with reprimands alone.

Still another study on overcorrection was done by Epstein, Doke, Sajwaj, Sorrell and Rimmer (1974) on two children in a day care program. For one child, a hand overcorrection procedure involving arm and hand exercises was introduced contingent upon inappropriate hand movement and later contingent upon inappropriate foot movements. For a second child, the hand overcorrection procedure was introduced contingent upon inappropriate hand movements during a free play period and later contingent upon inappropriate vocalizations at nap time. In this study, several concurrent behaviors were measured to assess multiple effects of treatment. Results for both children indicated the hand overcorrection procedure suppressed inappropriate hand movements and inappropriate behaviors that were topographically dissimilar.

Facial: Teachers' facial expressions when conveying displeasure (scowling, frowning, head shaking, etc.) stop the behavior which they follow, at least for the time being. However, it is rare that teachers are not engaged in other "stopping"-type behaviors such as reprimanding or removing privileges at the same time. Therefore, little study has been focused on facial expressions as a separate variable.

Presence: The very act of a teacher withdrawing his or her presence affects the behavior of young children. One of the earliest studies demonstrating this phenomenon was that of Allen, Hart, Buell, Harris and Wolf (1964) in which a preschool child's isolation from peers was reduced by withdrawing teacher attention when the child was not with other children. Though the teacher attention (talking, smiling, watching, etc.) was not differentially counted in this study, teachers noted that their proximity seemed reinforcing to this child's isolate behavior.

LeBlanc, Etzel and Domash (in press) discuss the power of teacher presence or absence. They cite the Hursh, Cooper, Reuter, and LeBlanc study (Note 26) in which it was demonstrated that children spent more time in activities in which teachers were actively participating than in activities in which no teacher was present, or if present, was not participating. Hatfield and Goetz (Note 27) demonstrated that less social interaction occurred among a small group of preschool children when a non-interfering teacher sat nearby than when no teacher was present.

It has also been demonstrated that children talk more to each other when a teacher is present but not talking (Rintoul, Cooper, Schilmoeller & LeBlanc, 1975). LeBlanc et al. (above) conclude that, while the presence or absence of teachers is important in learning programs for young children, the behaviors that teachers engage in while present is of equal importance.

Extinction: The term extinction is used for the behavioral phenomenon weakening of a response when followed by a neutral consequence or no consequence at all. The term is also used to label the procedures that produce the phenomenon. This procedure is often used in conjunction with reinforcement to strengthen a desirable behavior. The behavior to be strengthened is usually incompatible with the behavior to be eliminated.

Thus, when a teacher or parent stops giving attention contingent upon a certain behavior, the behavior will usually extinguish or decrease in frequency (Bijou, 1965). Many undesirable behaviors have been decreased when teachers stopped attending to them. In 1961 Baer described the effect of withdrawing social reinforcement on young children. In another very early study (Zimmerman & Zimmerman, 1962) demonstrated the control of tantrum behavior in a classroom setting. Harris, Johnston, Kelly and Wolf (1964) eliminated the infantile locomotor behaviors of a three-year-old preschooler; Hart, Allen, Buell, Harris and Wolf (1964) eliminated operant crying in two preschool boys using a straightforward extinction procedure; Wolf, Birnbrauer, Williams and Lawler (1965) stopped a child from recurrent vomiting in the classroom.

These early analyses set a trend for a large number of studies using extinction procedures. Many of these studies have been cited elsewhere in this review. They are frequently coupled with the reinforcement of appropriate behaviors. In Allen, Hart, Buell, Harris and Wolf (1964) study, for example, while teachers did put the child's isolation from peers on total extinction, they responded richly to the child for all approximations to peer interaction.

There have been some attempts to study the side effects of extinction on preschool children (Sajwaj, Twardosz, & Burke, 1972). Efforts were made to reduce a retarded child's excessive verbalization to teachers during free play. Every time this child initiated a conversation during this period they ignored him. Not only did the child's verbalizations to teachers decrease but his interactions with children increased, as did his use of girls' toys during free play. Concurrently appropriate behavior at group time decreased and disruptions rose. A second study was then undertaken. The teacher alternated conditions of praise and ignoring for talking with children. Verbalizations to children varied accordingly. In addition, using girls' toys and group disruptions rose during the ignoring condition and appropriate behaviors decreased. The last procedure used in the study was a timeout to eliminate the undesirable side effects of disruptions and use of toys considered inappropriate for male use. Timeout is an often used procedure for bringing children's behavior under control.

Timeout: Timeout is a commonly used (and too often misused) procedure for weakening behaviors deemed inappropriate. Removing the child for a short period of time from available reinforcement is the basic timeout procedure. There is a question about the effectiveness of using timeout as a consequence for classroom misbehavior during classroom work activities because those activities may not be particularly reinforcing (or not at all reinforcing) for the child. Thus timeout may give the child an opportunity to avoid doing the work.

Timeout is a form of punishment. Hawkins (1977) suggests several ways in which timeout can be accomplished. One is by removing the child from the environment in which reinforcers are plentiful. In one early study Sloane, Johnston and Bijou (1967) treated a four-year-old boy's biting, kicking, hitting and gouging by removing him from the preschool classroom when any of these behaviors occurred. He was taken to a small adjacent room devoid of toys and other manipulative objects where he remained, alone, until he had ceased tantrumming for two minutes. At that point he was returned to the classroom where any approximations to appropriate behaviors were reinforced. A rapid decrease in aggressive behaviors resulted.

Timeout can also be accomplished by "shutting off the flow" of reinforcers, as when a teacher, wishing to decrease tattling behavior simply turned away without comment as soon as it was apparent that child had come to tattle (Wright & Hawkins, 1970). Another form of timeout is for the teacher to simply terminate a pleasing activity. Here the teacher stops a game, a story, or a free play activity in which the child or children were participating when maladaptive behaviors occurred.

There are varying degrees of timeout in terms of physical removal of the offending child. Sloane, Johnston and Bijou (1967) above described the most stringent type: removal to a separate room where 1) no social or manipulative reinforcers are available to the child and where 2) the child is required to cease tantrumming, and 3) must remain quiet for two minutes before being returned to the classroom. In the case of a child who resisted going into timeout and who screamed and banged on the door of the timeout room, another procedure was introduced. This was a child reported by Lahey, McNees and McNees (1973) who uttered obscene statements at a high rate. Upon the emission of an obscenity the child was placed in a lighted but barren 4 x 10 room adjacent to the classroom for 15 minutes. The variation on the basic timeout procedure was that if the child went into timeout immediately and without resistance he earned five minutes off his timeout period. The child could earn another five minutes off his timeout period by quieting down as soon as he entered timeout.

A timeout room is not always available. Various temporary or impromptu timeout settings such as "telephone booth" type enclosures (Reichle, Brubakken, & Tetreault, 1976) and screened off areas have been used. Allen, Benning and Drummond (1972) demonstrated one such procedure by simply forming an enclosure out of two sets of preschool cubbies or lockers placed back to back (about three feet apart) and projecting out from the wall in a parallel fashion. When the child, a four-year-old girl, was placed in timeout contingent upon severe physical attacks upon other children, the front of each of the two sets of cubbies were pulled together and fastened to form a V-shaped enclosure devoid of reinforcers.

For some children (not children with problems as severe and unmanageable as those described above) a simple chair timeout is often effective. In a study by Baer, Rowbury and Baer (1973) the teacher used a chair placed in the middle of the room so that children could not reach materials. If a child left the chair without permission, or screamed out, the one-minute timeout period was extended for another minute following the child's quieting.

An even milder form of timeout called "contingent observation" is reported by Porterfield, Herbert-Jackson, and Risley (1976). In this study caregivers used occasions of disruptive behavior to instruct the child in appropriate alternatives and to move the child very briefly to the perimeter of the activity to observe the appropriate behavior of the other children. When the caregiver saw that the child had been watching for a brief time (usually less than a minute) the child would be approached with a question relevant to the preceding event: "Can you ask for the truck, now?" When the child returned to the group the caregiver gave positive attention for positive behavior: "Good, you asked for the truck!"

A disruptive child who did not calm down or refused to sit quietly on the periphery was taken to a slightly more remote timeout place used as a quiet place for toddlers in need of brief respite from group activities. This was a standard mesh playpen with sides covered by a colorful bedsheet. The caretaker might say to the child, "Rest here until you are quiet." As soon as the child was calm and quiet the caregiver asked if the child was ready to sit and watch. At that point the child was returned to the sit and watch position for a minute or less.

Another form of timeout does not require the removal of the child. The teacher simply assumes a head-dropped, mute, inert position. This procedure was demonstrated a number of years ago in two films, Allen and Harris (Note 28) and Brawley, Harris, Allen, Fleming and Peterson (1969). The nonresponding, "unseeing," inert teacher proved to be an effective timeout procedure in both instances. In the first case, however (Allen & Harris) the preschool teacher did leave the small 5 x 8 instructional room a few times in the beginning because of the severity of the child's physical assaults upon her. After a few such total removals of teachers' presence, the "inert" pose became an effective timeout contingency for inappropriate responding.

One other variation in timeout was demonstrated by Allen, Everett, and Turner (1970) with a child given to severe tantrums in the classroom. When the child began to tantrum the teachers simply cleared the classroom of all children and teachers. Weather permitting, the other children had an extra free play time out-of-doors, otherwise a very "special" story in one end of the school corridor out of line of traffic. One teacher stayed behind, outside the classroom door ready to make a positive contact with the tantrumming child. Once he had been quiet for one minute, she would go in and assure him that the children would be back very soon "now that you are quiet." Emptying the classroom of peers and teachers also proved effective in reducing the tantrum behaviors of a four-year-old girl who was also the child in the "cubby timeout" described earlier by Allen et al. (1972).

Clearing the classroom of children and teachers has some disadvantages. One, if the contingency must be evoked frequently over a protracted period of time, it is disruptive of the other children's learning environment. In each of the cases reported above the procedure ended tantrumming with only five and two removals respectively. The second possible disadvantage is that the procedure may "backfire." A severely distraught child may wreak intolerable havoc and distruction upon the classroom. Therefore, teachers must "know" their child before employing an evacuation timeout. In one early study a severely distrubed youth put his fist through the window in the room in which he was confined.

One or two final comments on timeout will conclude this brief overview. One deals with a mother serving as the person who removed the child from the preschool classroom each time the teacher signalled the occurrence of a behavior or targeted as disruptive (Briskin & Gardner, 1968). The child was taken into the hall for a two-minute timeout. Improvement in the child's rate appropriate behaviors was rapid, while disruptives were very nearly eliminated.

The other issue is that a timeout may have an effect opposite of what is intended. Solnick, Rincouver and Peterson (1977) got a substantial increase in tantrum behavior in a six-year-old autistic child as a function of timing her out. Timeout apparently provided the child ample opportunity to engage in highly reinforcing self-stimulatory behaviors. In a second study Solnick et al. investigated another case of failure of timeout to reduce maladaptive behaviors. They discovered that "time out" had to be enriched before timeout was effective.

Response Cost: Response cost is usually the removal or taking away of positive reinforcers contingent upon the emission of undesirable behaviors. Homme, Csanyi, Gonzales and Reichs (1969) refer to such arrangement as contingency contracting. The child may either receive or lose conditioned reinforcers depending upon his or her behavior. In group situations or token economies the members may earn tokens for appropriate behavior or lose tokens for inappropriate or prohibited behaviors (Burchard, 1967; Burchard & Barrera, 1972).

Response cost contingencies are most frequently associated with token economies. McIntire, Jensen and Davis (Note 29) demonstrated the effectiveness of such a procedure with elementary and junior high school boys. Each child gained points for correct answers and lost them for disruptive behaviors.

Kaufman and O'Leary (1972), in a children's unit in a psychiatric hospital, assigned patients to one of two groups. One group was the "response cost" group. They received tokens at the beginning of the period and had points taken away for inappropriate responding. The other group, the "reward" group received their points following appropriate responding. The results from the response cost and reward procedures did not differ. No undesirable side effects of the response cost system were noted.

McLaughlin and Malaby (1972) got a different result. They found that contingent point gain for quiet behavior produced lower rates of inappropriate verbalizations than did contingent point loss for inappropriate verbalizations. Iwata and Bailey (1974) also found reward and cost programs equally effective.

However, the question of the effectiveness of a response cost system is far from settled. The token dispensing procedures used in the Kaufman and O'Leary (1972) study and the Iwata and Bailey (1974) were noncontingent in nature. Students were given "free" tokens that were removed contingent upon emission of inappropriate behavior. In contrast, McLaughlin and Malaby (1972) reported negative results in conjunction with response cost. These experimenters employed a system in which the tokens removed had been earned earlier for appropriate responses. It may be that a more punishing or aversive condition is created when earned reinforcers are removed than when "free" reinforcers are taken away.

Iwata and Bailey (1974) suggest side effects relevant to reward and response cost procedures. They have to do with the possible effect on the teacher, or other reinforcing agent. In their study, the teacher delivered higher percentages of verbal approval toward the reward groups. The authors conclude (most tentatively) that reward procedures may lead to slightly greater amounts of teacher approval than do response cost procedures.

Tokens, of course, are not the only things that can be removed in order to invoke a consequence to decrease a behavior. Moffat (1972) used the interruption of high- and low-value music as a consequence in a panel-pressing task. Baer (1961) studies the interruption of positive reinforcement as a means of controlling behavior in young children. In one study he effectively used cartoon interruptions as an aversive stimulus in an avoidance conditioning procedure related to bar-pressing. In a later study Baer (1962) demonstrated that children would press a bar in order to avoid the loss of a puppet's contingent attention.

Imposed delay is a related control measure studied by Whitehurst and Miller (1973) to reduce a disruptive and aggressive behavior of preschool children in a bus. In this study children who misbehaved were not allowed to get off the bus when it passed their home. Instead they had to wait until the second time around. This was an effective management procedure for controlling the disruptive behaviors.

The question of timeout, response cost, and other aversive events as an effective control of behavior is one for which there are no definitive answers.

Shaping and Fading: The processes of shaping and fading are difficult to discuss as separate entities inasmuch as most studies employ a form of both procedures to arrive at the desired response. These strategies, singly or together, may be employed as an antecedent instructional strategy or as a consequent instructional strategy. This temporal shifting will be noted as the topic of shaping and fading is explored.

Shaping is a vernacular term for response differentiation. In teaching a child to draw circles, for example, the teacher must first reinforce the child for learning more and more efficient ways of holding a pencil, then for drawing curved lines, then for drawing closer and closer likenesses of a circle and finally for drawing an acceptable circle. The procedure the teacher employed is described as differential reinforcement of successive approximations to the target response, circle drawing. Thus, in a shaping procedure, response variations resembling a desired behavior are reinforced selectively while less relevant (or appropriate) variations are not reinforced. Instead they are extinguished.

The area of language development yields ample data to illustrate shaping procedures (Staats, 1968). Sloane and MacAuley (1968) provide extensive empirical analyses of this phenomenon. A program for strengthening attending behavior through successive approximations is often the initial step in language training (Lovaas, Berberich, Perloff & Schaeffer, 1966). After attending behaviors have been established other prerequisite training for developing language is begun. Many language programs, for example, have intensive training in imitation as a major prerequisite. Hewett (1968) described how a five-year-old was taught, through successive approximations, to imitate various sounds by reinforcement with food, music and activities. Gradually, response requirements were stiffened until the child was saying recognizable words. In order to make the child's speech more functional, the therapist's verbalizations, which served as prompts, were gradually faded out and replaced with objects and printed words.

Most behaviors can be taught in this fashion. Profoundly retarded children who were unable to feed themselves or to use eating utensils were trained to do so using shaping and fading procedures (Berkowitz, Sherry & Davis, 1971). In the initial step of the program the teacher guided a spoonful of food into the child's mouth. As the child learned to coordinate hand and arm movements, teacher help was withdrawn progressively. Aversive contingencies were applied for eating with the hands. The child was removed from the table for a period of time or the food was taken away for that meal.

Vogler, Masters and Marrill (1970) demonstrated the shaping of cooperative behavior in young children on a stylus synchrony task. Stone (1970) described the use of shaping procedures in a classroom of young cerebral palsied children to increase self-help skills, preacademic skills, visual and auditory memory, and vocabulary.

Allen, Henke, Harris, Baer and Reynolds (1967) demonstrated the increase of a child's span of attention to free play activities and Fowler, Rowbury, Nordyke and Baer (1976) taught alternate foot descent of stairs through a combination of shaping, match to sample, and fading techniques. Fading techniques are often an important part of a shaping.

Shaping is also related to a core instructional procedure--systematic discrimination training. Such training consists of reinforcing a response in the presence of a particular stimulus (e.g., reinforcing a child for saying, "red" when the child is asked the color of the red sweater the child is wearing) and not reinforcing a response given to an inappropriate stimulus. It is in this fashion that discrimination repertoires are gradually established.

In discrimination training, fading techniques are frequently employed. For a child having trouble discriminating b from d the teacher might try making the circle part of each of the letters a different color, blue for b and red for d to see if heightening the difference between the stimulus letters would serve as a helpful prompt. If the color cueing is successful and the child does learn the discriminaton under that condition, the teachers' next job is to wean the child from this extraneous cue. This is where the fading technique comes in. In the example above, color can gradually and literally be faded through prepared successive stimulus presentations during which correct response continue to be reinforced.

The shaping and fading process has been of inestimable value in teaching a wide range of behaviors to retarded and otherwise handicapped children. There are innumerable training manuals that spell out precise shaping and fading procedures to teach everything from eye contact to transfer of self from wheelchair to toilet. Only a small sample will be cited. The Pennsylvania Training Model (Sommerton & Turner, 1975) is one example. Others are Verna Hart's Beginning with the Handicapped (1974), Bender and Valletutti's Teaching the Moderately and Severely Handicapped (1976), and Copeland, Ford and Salons' Occupational Therapy for Mentally Retarded Children (1976).

Summary of Packages of Instructional Events

Antecedent and consequent teaching strategies have been described in discrete categories for the purpose of this review. In a practice, a teacher will often combine multiple instructional events when teaching a new behavior. In some cases an antecedent event will be chosen to produce a behavior, and a consequent event will be chosen to reinforce the new behavior produced. In other cases a teacher will combine more than one antecedent prompt or more than one consequent event to produce and maintain the occurrence of a behavior.

Combinations of instructional events are called teaching packages. Most decisions about events to include in a package are based on the teacher's best estimate of those events that will produce the most rapid acquisition of a new behavior or those events that will optimally strengthen the newly acquired behavior. In many research studies the experimental analysis will demonstrate that a total package produces desirable behavioral changes, while the absence of the package does not produce those changes. If the total package has been easy and inexpensive to deliver, the teaching agent may decide that a more detailed analysis of the package is unnecessary. In the absence of separate analyses of package elements, it is not known conclusively whether all parts of the package are necessary for the desirable result.

Some research studies do examine the separate elements of a teaching package to determine which parts are necessary and the relative influence of certain elements in producing the behavioral change. Detailed examinations of teaching packages are called component analyses. Component analyses can be conducted in an additive fashion or a subtractive fashion. In the additive model, components of a package are added one at a time across successive experimental conditions, and the level of behavior change is compared in adjacent and successive conditions. In a subtractive component analysis it is demonstrated first that the total package produces a desirable result. In subsequent experimental conditions, elements of the package are removed, one at a time, and the relative levels of behavior are compared in adjacent and successive conditions.

Elaborate component analyses of teaching packages can be very time consuming. In many instances the time costs will not be matched by sufficient new information to justify them. In other cases therapeutic goals for the children being treated may mediate against the extra time required for a component analysis, especially if it involves numerous conditions that produce decrements in desirable behavior. Many studies of teaching packages employ minimal component analyses to balance information gains with factors of time and therapeutic goals.

A common component analysis in experimental studies examines the necessity for both antecedent and consequent elements in a teaching package designed to train a new behavior. In the O'Brien, Bugle, and Azrin (1972), self feeding study, manual guidance alone (antecedent prompt) was not sufficient to establish high levels of appropriate independent self feeding. When manual guidance was combined with a consequent component of restraint for inappropriate feeding responses, appropriate self feeding increased to desirable levels. In the same fashion, restraint alone was not sufficient to produce high levels of independent self feeding. Therefore, both the antecedent event (manual guidance) and the consequent event (restraint) were necessary components in the package to teach self feeding. Similar results were reported by the same authors (O'Brien, Bugle, & Azrin, 1972) in a teaching package designed to decrease levels of crawling and increase levels of walking in three retarded children. Two components were necessary to produce the desired behavioral changes--an antecedent prime (lift to stand) and a consequent restraint for crawling.

The Ingram et al. (in Baer & Wolf, 1970) study of a preschool child's peer social interaction examined the components of a package which contained direct primes, indirect primes, and intensive adult social reinforcement. It was established that either direct or indirect primes alone could produce consistent but minimal increases in the child's peer interaction. High levels of peer interaction were established initially only when direct and indirect primes were combined with intensive adult social reinforcement.

An elaborate component analysis was conducted within the Hardiman et al. (1975) study of a preschool child's motor behavior. The analysis provided detailed information about the roles of primes, contingent attention, and specific training in a package to teach both general participation (unskilled) and skilled participation. The successive conditions provided the following results:

1. Primes alone were more effective than contingent attention alone in increasing general participation on five pieces of outdoor play equipment;
2. Neither primes alone, contingent attention alone, nor the two combined produced any change in skilled participation on the equipment;

3. A combination of primes, contingent attention, and specific training produced increases in skilled participation. Specific training initially was necessary to establish skilled motor performance;
4. Gains in skilled performance could be maintained by primes plus contingent attention, but not by contingent attention alone.

The previous studies have varied in the detail or complexity of the component analyses of elements within teaching packages. Common to these studies is the finding that both antecedent and consequent events may be necessary in the initial teaching of a new behavior. Neither antecedent nor consequent events alone were sufficient to produce therapeutically significant levels of behavior change. New behaviors often require some level of both prompting and reinforcement. However, some contradictions do exist: Lahey (1971) needed only models, and no contingent reinforcement, to produce increased levels of descriptive adjective usage.

Given the possibility that either consequent or antecedent events alone may produce the desired behavior change, it may be wise to conduct at least minimal analyses of antecedent versus consequent components of teaching packages. In one such analysis Rowbury et al. (1976) examined the role of antecedent and consequent sides of a teaching package designed to produce increased levels of completion of preacademic tasks in preschool children with severe learning and behavior problems. The results of this study demonstrated that: 1) the availability of a reinforcer (access to free play) alone could not produce increased levels of completion; 2) contingent free play plus antecedent teacher guidance (models, praise, physical assistance) could produce successively increased levels of task completion; 3) guidance alone (guidance plus noncontingent free play) could not maintain high levels of task completion. In this study the antecedent package was not subjected to a component analysis. It was demonstrated simply that the combined antecedent and consequent events in the total package contributed to the acquisition and later maintenance of the desired preacademic behaviors.

The extensive "incidental teaching" package that has been developed by Hart and Risley is a final example of a successful combination of teaching events. In early studies by Reynolds and Risley (1968) and Hart and Risley (1968) it was demonstrated that verbal prompts from a teacher, paired with delivery of requested materials, were primarily responsible for increases in talking and specific language forms in disadvantaged preschool children. Building on these results Hart and Risley (1974, 1975) and Risley and Twardosz (1976) have developed their incidental teaching model for training multiple language responses in disadvantaged children. The teaching package includes graded levels of verbal prompts (which have been described in an earlier section) plus the contingent delivery of requested materials. This total package capitalizes on child-initiated interactions of seeking materials from a teacher during normal preschool free play periods.

On each occasion in which a child initiates a request for a material, the teacher prompts a desired language response, using prompts appropriate to the child's level of skill. Appropriate responses to teacher prompts are consequated by the delivery of the desired materials. The effect of the total package of instructional events has been demonstrated repeatedly across a variety of language forms which include nouns, descriptive adjectives, and compound sentences. Each language form has increased only after the prompt and contingent materials package has been applied to that form.

The incidental teaching package is one example of a combination of instructional events that have not been subjected to a component analysis. The package, as a whole, has powerful effects each time it is applied, and it requires less teacher time than 1:1 training settings for each child. Since the package is both easy and inexpensive, component analyses of levels of prompts or contingent materials may be unnecessary.

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